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ABSTRACT

In child-centered programs children construct their own knowledge from their experiences and interactions with the world around them, and teachers foster children's growth and development by building on children's interests, needs, and strengths within a safe and caring environment. The Step by Step educational program developed a series of child-centered teaching manuals for caregivers and teachers in early childhood programs in Central and Eastern Europe. Initially directed at the preschool level for children ages 3 to 5, the series has been extended from birth to age 10. This manual provides upper primary grade teachers (8-, 9-, and 10-year-olds) with lessons, suggestions for extended activities, assessment strategies and forms, thematic curriculum webs, and complete resource and reference lists. The manual's contents are: (1) "Part 1: Presenting the Step by Step Primary Program," includes educating for the 21st century, goals for the program, developmental guidelines, moving from teacher-dominated to child-centered classrooms, the roles of the teacher in the child-centered classroom, creating child-centered classrooms, ongoing assessment, and family participation; and (2) "Part 2: Implementing the Step by Step Primary Program," includes literacy, visual arts, mathematics, science, social studies, and example thematic units of study on India, weather, wool, and bats. Contains 23 references. (EV)

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STEP
AND FAMILIES
BY
FOR CHILDREN
STEP
A PROGRAM

CREATING CHILD-CENTERED CLASSROOMS

PS 026450

8-10 YEAR OLDS

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STEP BY STEP

A PROGRAM FOR CHILDREN AND FAMILIES

CREATING CHILD-CENTERED CLASSROOMS FOR 8, 9, & 10 YEAR OLD CHILDREN

KATE BURKE WALSH

FOREWORD BY
PAMELA A. COUGHLIN

The Soros Foundations/Open Society Institute is a network of foundations, programs, and institutions established and supported by philanthropist George Soros to foster the development of Open Societies around the world, particularly in the former communist countries of Central and Eastern Europe and the former Soviet Union. To this end, the Soros Foundation cooperates with Children's Resources International to develop and implement the project called Step by Step: A Program for Children and Families.

Children's Resources International, a nonprofit organization located in Washington, D.C., promotes the implementation of sound educational practices developed in the United States while maintaining the cultural traditions of the participating countries.

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FOREWORD

The Open Society Institute and Children's Resources International formed a partnership to introduce child-centered teaching methods to the academically sound classrooms of Eastern and Central Europe and countries of the former Soviet Union. In so doing, the aim was to engender within young citizens a sense of choice and participation in their futures and those of their countries. Step by Step, the educational program that grew out of this partnership, is founded on several principles: parents are actively involved in the education of their young children, children are given the opportunity to make choices and understand the consequences of those choices, teachers individualize subject matter to meet the needs and interests of the child, and teachers receive support for their professional development.

Creating Child-Centered Classrooms: 8, 9 and 10 Year-Old-Children, the third in a series of publications intended for classroom teachers, reflects the growth of the Step by Step Program. Initially begun as a preschool program for children three to five-years old, the Step by Step Program was extended to primary schools at the request of parents who saw their children flourishing in classrooms that met their children's developmental needs.

Creating Child-Centered Classrooms: 8, 9 and 10 Year-Old-Children is intended for teachers of children approaching the last years of early primary school. The practices promoted move teachers from adult dominated to child-centered classrooms. The methods offer children opportunity for greater freedom of expression and discovery through manipulation and experience as the children become more abstract thinkers.

Those of us who have had the privilege of working with the European educators in the Step by Step Program are deeply indebted to them for what they have taught us about the importance of open societies, for their intelligence, their devotion to children, and their respect for the parents of those children. Step by step, we have moved from the education of very young children to the middle years, forming life-long learners on both sides of the Atlantic.

Pam Coughlin
Children's Resources International

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> *The bottom line in the work of my foundations is to empower people who will make the sacrifices necessary to build open societies and who will care for and protect the freedoms they obtain for coming generations.*
>
> George Soros

Thanks to the vision and support of Mr. Soros, Children's Resources International (CRI) has been a part of this building process by offering a new educational model to the future generations of open societies.

Liz Lorant has broadened the vision of the project to include children and families in primary school. Expanding on the philosophy and goals that have been so successful in kindergarten classes in Europe, the program now moves to a new and even greater challenge. That is, to create child-centered classrooms for eight, nine and ten-year-old children. We maintain a true partnership with our teams from the following countries: Albania, Belarus, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Haiti, Hungary, Kazakhstan, Kyrghystan, Lithuania, Macedonia, Moldova, Romania, Russia, Slovakia, Slovenia, Ukraine, Yugoslavia. This partnership continues its hard work and dedication to the basic concepts of the Step by Step Program as we proceed to respond to teachers, parents and children in the upper primary years.

We are grateful for the perspective that our Soros counterpart Liz brings to this work. She sees the big picture and clearly articulates the path to follow. We will continue to work to make her dream a reality.

The other member of the Soros team is Sarah Klaus. She has worked tirelessly to help put all of the pieces of the picture together. She both designs the mosaic and then fills in the gaps. We appreciate all of her support and attention to details.

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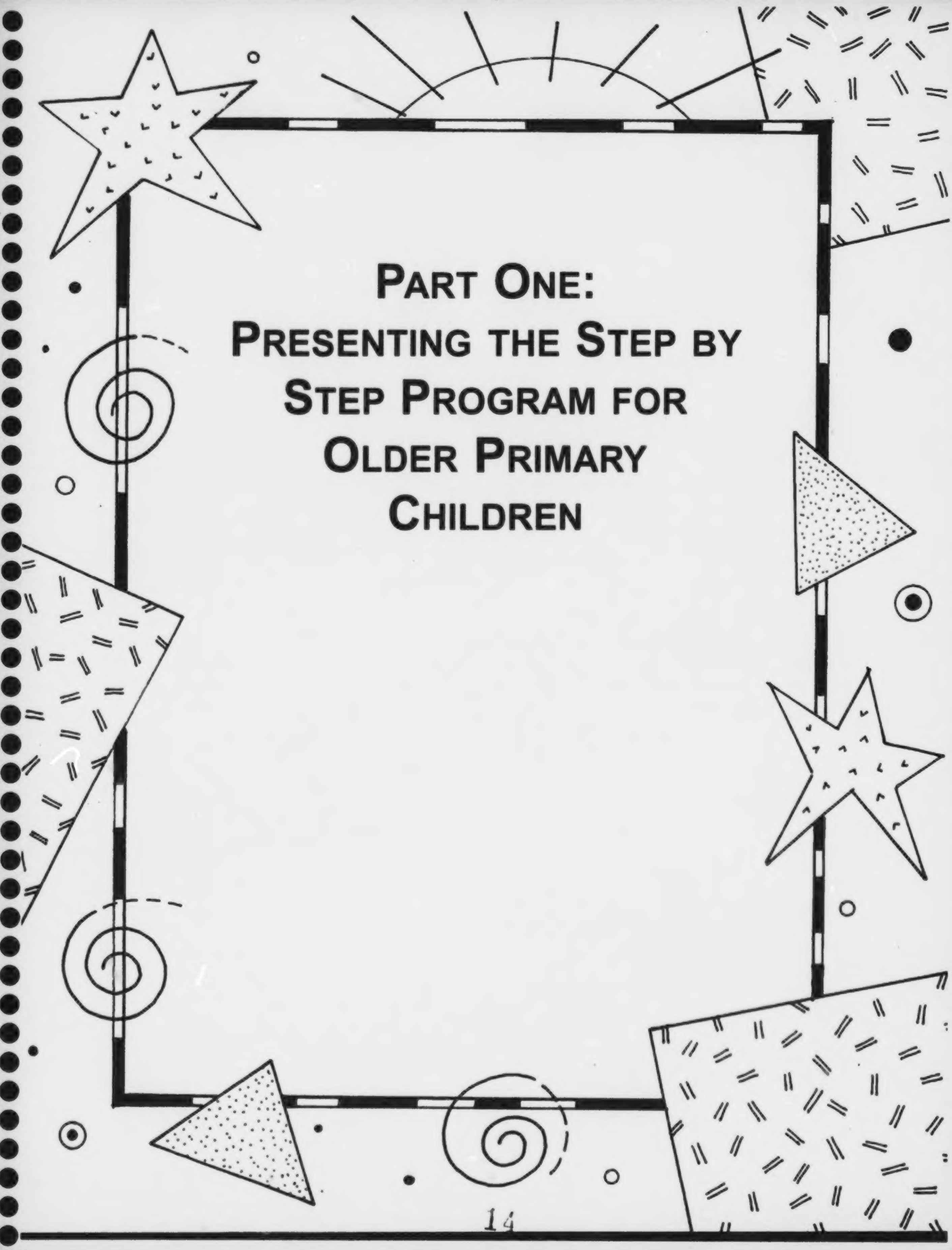
Kate Burke Walsh

INTRODUCTION

Part One introduces the Step by Step Primary Program for the older primary student. Chapter I presents the philosophical overview, rationale, and theoretical basis and also describes the unifying concepts and expectations. Chapter II presents educational goals for eight, nine and ten-year-olds in content areas such as mathematics, literacy, science, social studies, and art. These general goals serve as standards in the Step by Step Program. In Chapter III, developmental guidelines for these ages are presented and discussed. Chapter IV offers a comparison between the teacher dominated classroom and a child-centered one. Chapters V and VI are designed to inform teachers about the role of a teacher in a child-centered classroom and how to create such a classroom. Chapter VII reviews the assessment process and offers numerous practices and examples.

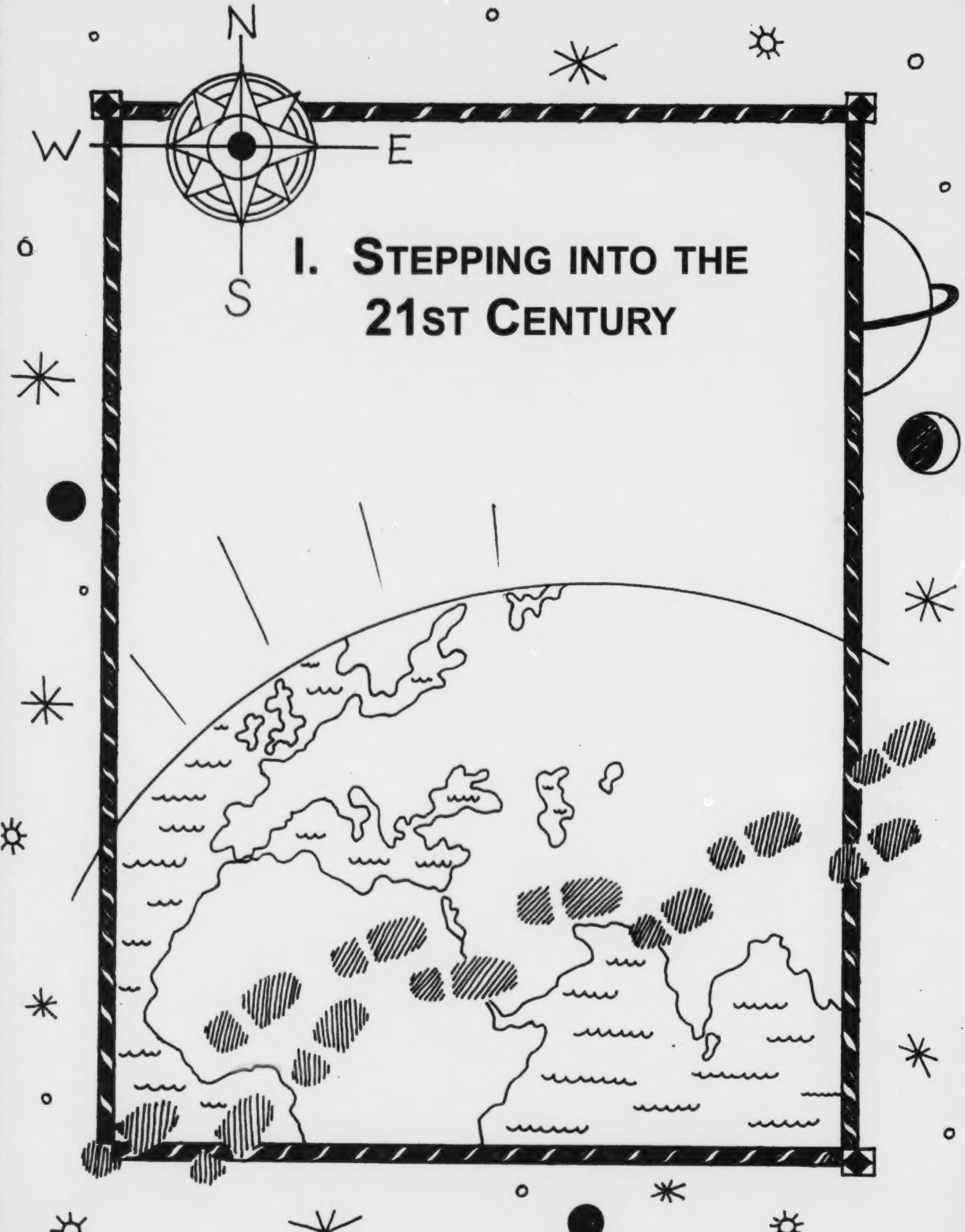
Chapter VIII extends the idea of parent participation in the primary grades. A variety of ways parents can stay involved in their children's classes and schools are presented, along with the philosophical commitment to a continued partnership with parents.

Part Two includes Chapters IX-XIII and discusses the content areas of Literacy, Visual Arts, Mathematics, Science, and Social Studies and provide Sample Lesson Plans for teachers. Chapter XIII, on Social Studies, includes extensive examples of integrated teaching through thematic units.



PART ONE: PRESENTING THE STEP BY STEP PROGRAM FOR OLDER PRIMARY CHILDREN

I. STEPPING INTO THE 21ST CENTURY



I. STEPPING INTO THE TWENTY-FIRST CENTURY

> *Education shall be directed to the full development of the human personality and to the strengthening of respect for human rights and fundamental freedoms.*
>
> Jean Piaget

Overview of the Step by Step Primary Program

A firm belief in the principles of democracy underlies the Step by Step Program for children. Both preschool and primary programs encourage children to become active citizens and to appreciate the values inherent in a democratic way of life. As the Step by Step Primary Program examines the needs of the older primary child, it continues to promote the core values of mutual respect, responsibility between adults and children, honesty, caring, and diligence. Adults who intentionally model these values in their daily interactions with eight, nine, and ten-year-old children are teaching vital characteristics to the leaders of the future. These characteristics are the basis for character development in the Step by Step Primary Program. Teachers guide the eight, nine, and ten-year-old child in making choices and taking personal responsibility for those choices. Children in democratic classrooms are encouraged to formulate and express their own opinions. Questions are solicited. Discussions are promoted.

The Program continues to adhere to the philosophy, principles, and practices of the Step by Step Preschool Program. It is rooted in a firm commitment to:

- Family participation.
- Developmentally appropriate practices which take into account the whole child.
- A child-centered approach to teaching based on individualization.
- Learning centers in the classrooms.
- Ongoing training and technical support for teachers.

The authors of the Step by Step Primary Program define their most urgent task as the need to create a new educational model that will make each child aware of the interdependence of all of life. We have drawn on the works of many in creating this document: leaders in the field of cognitive psychology and researchers in the fields of brain development, social science, and education. Our aim is to fuse the best of what we know from European and American educational philosophies in order to develop educational practices that honor the individual as a creative thinker in an interdependent world.

Unifying Concepts and Goals

The Step by Step Primary Program exposes children to four powerful concepts that are central to the design of the methodology: communication, caring, community, and connections. Communication is the key concept for teaching skills and information in literacy, including reading, writing, speaking, listening, spelling, visual arts, and mathematics.

Caring is the theme that provides the impetus for the study of science, including life science, physical and earth science, as well as character education. Community helps children and teachers conceptualize the interconnectedness of history, geography, and civics. Connection, defined as the ability to interrelate life experiences, help children bridge new concepts from the known and develop an empathetic world view. Through these specific concepts, the Step by Step Primary Program maintains four goals:

- To develop life-long learners
- To create a learning environment based on mutual respect and democratic principles
- To ensure developmental continuity and practices
- To ensure that all children acquire academic, artistic, ethical and practical skills to successfully participate in a democratic society

From Theory to Practice

Caring

Caring is the first value on which much of the conceptual academic work is built. Children learn to care about and for themselves as they see their parents, teachers, and other important adults in their lives become involved in their early learning experiences. They develop strong, positive self-concepts as they experience success in daily activities. Caring adults demonstrate a responsive attitude which children will emulate as they learn to care for themselves, each other, plants and animals, and their environment. The content areas of the Step by Step Primary Program support the growth of skills necessary for children to become capable care givers. Through literacy development, children learn to formulate and express their opinions in writing and speaking. In mathematics, they learn to value careful thinking, alternative solutions, and the world of currency and numbers. Through science explorations, children learn ways to care for themselves physically, for the environment in which they live, and for living things in the world around them. In social studies, children come to value an historical perspective. They develop a sense of caring and respect for the people and events that have shaped the present. Art allows children the opportunity to express emotions and ideas. By sharing art experiences and learning about art from other cultures, children recognize that there are things all people care about and have in common.

Communication

Communication is another skill that is valued by the Step by Step Primary Program. The ability to communicate clearly is the key to successful involvement in a democratic society. Using an individual approach to learning, teachers encourage children to communicate through speech, a variety of written forms, in mathematics, and many different art mediums. As children develop the skills and confidence to communicate well, they take initiative and are motivated to pursue important ideas. Through communication, children can understand the points of view of others and appreciate both the diversity of thinking and culture, and the commonalities that all people share.

Teachers in the Step by Step classroom recognize that it takes time to teach children the appropriate ways to communicate their important feelings. Teachers model language and actions that communicate a responsive, caring attitude. Teachers help children to communicate their needs and, in doing so, help them to recognize ways they can respond to the needs of others. Eventually, children learn ways of clarifying misunderstandings and of resolving conflicts through the careful use of language. Good communication is a valuable tool in resolving disputes and building community.

Connection

Connection is the term that describes the ability to link new information to past experiences thus constructing knowledge. The ability to make connections is the third basic value that supports the content areas of the Step by Step Primary Program. Children by nature are actively constructing and building knowledge all the time. We are often amazed and amused by the surprising associations that children make in their ongoing efforts to apply new information to known situations. When this happens, they are busy building their repertoire of experiences. The Step by Step Primary Program provides opportunities for discovery, exploration, and practice. Through such activity, eight, nine, and ten-year-old children create experience "links" as they build information structures. Throughout the year, children are encouraged to see similarities among people and the living things that share the earth. They are helped to recognize the connections that exist in cultures, traditions, and language. One teaching method that is based on the concept of connecting information is that of thematic units of study. A thematic unit of study presents a general concept through in-depth study of a topic or object. Chapter XIII presents the concepts of change, atmosphere, and environment through an in-depth study of weather. By considering weather conditions from the five subject areas (literacy, mathematics, social studies, science, and art), students realize the interconnectedness of numerous aspects of this particular topic. Thematic units of study are the vehicles for integrating teaching for the older primary student.

Community

Community building takes time and attention. Each classroom in the Step by Step Primary Program is a potential community of learners in which showing kindness and care to one another is highly valued. The use of language and other kinds of communication is the means by which members of the community are included, resolve issues, solve problems, and explore new ideas. Working cooperatively on projects that are based on the interests of the class establishes connections among individuals, as each member builds new learning. A well-designed Step by Step classroom operates on the assumptions that everyone has a need to belong to a community and has a need to feel useful to others. These classes depend on the members to contribute in academic, social, and practical ways. Children become responsible, contributing members of the classroom community because they are needed, depended on, and genuinely valued for the contributions that they make. Because teachers allow ample time for children to express themselves, to get to know each other, and to appreciate their various strengths and talents in many areas, each person feels valued as an individual.

Time and attention in daily routines, through simple actions, and in joyful celebrations, nurture the building of community. When a group of people, young or old, work and play together, they build a community.

Caring, communication, making connections, and building a community of learners provide a strong base on which children build knowledge in the Step by Step Primary Program.

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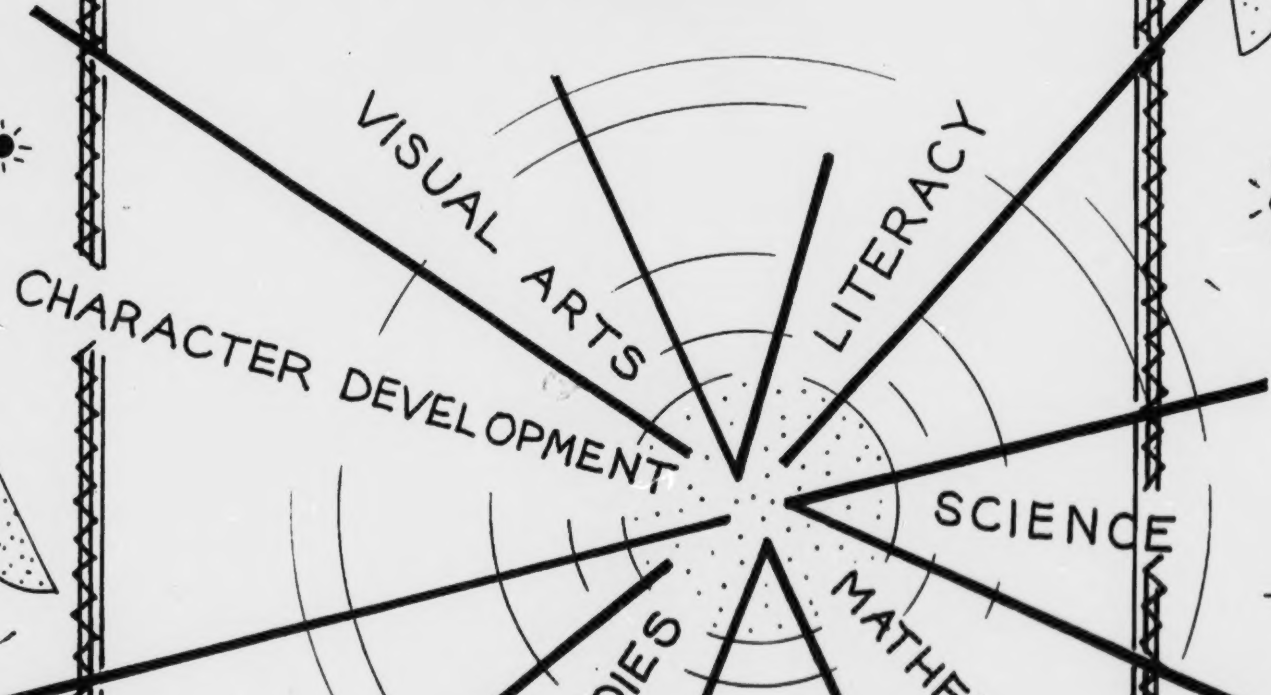
II. STEP BY STEP PROGRAM GOALS FOR 8, 9 & 10 YEAR OLD CHILDREN


VISUAL ARTS
LITERACY
CHARACTER DEVELOPMENT
SCIENCE
SOCIAL STUDIES
MATHEMATICS

II. STEP BY STEP PROGRAM GOALS FOR 8, 9 & 10 YEAR OLD CHILDREN

> *Treat people as if they were what they ought to be, and you help them to become what they are capable of being.*
>
> Johann von Goethe

The fundamental goal of the Step by Step Primary Program is to foster healthy academic and personal growth in elementary-age school children. Goals for the program respect the intellectual, social, and developmental needs of the eight, nine and ten-year-old child. Goals for learning and teaching are established in the following areas: cognitive, physical, social, emotional, and aesthetic. By considering these basic areas of human development, the needs of the whole child are taken into account as teachers make decisions about curriculum, instruction, and assessment. By clearly defining and maintaining high standards for achievement, the Step by Step Primary Program assures quality in all areas of learning and teaching. In setting high standards, teachers make considered adaptations for their students as they individualize instruction instead of shifting the entire burden of adaptation to the students.

> *Teachers serve children particularly well when their standards and learning challenges require students to stretch themselves to succeed, so long as the degree of stretching is within students' reach. Tasks that frustrate or overwhelm serve no constructive purpose. When learning tasks are confounding, many students withdraw, sometimes quitting altogether and becoming alienated from school learning.... Assignments and responsibilities that confront youngsters with tasks and objectives within the reach of their potential at the time are the ones that stimulate commitment and effort. As children learn to manage these challenges successfully, their self confidence grows and they develop healthy mental attitudes*
>
> (P.S. George, Stevenson,
> Thomason & Beane, 1992, p. 22).

The following pages highlight general goals that serve as standards in the Step by Step Primary Program.

General Goals for Character Development

The Step by Step Primary Program fosters character growth in eight, nine, and ten-year-old children so that they will:

Participate in fair and honest ways in school and community life.

Demonstrate self-reliance by being well organized.

Work with others in a cooperative spirit.

Report in writing or verbally about personal and societal values.

Show respect for others by listening with empathy and responding appropriately.

Take personal responsibility for a community service project.

General Goals For Literacy

The following are learning outcomes that The Step by Step Program defines for eight, nine, and ten-year-old children. They will learn to:

Realize the inherent value in freedom of expression.

Take risks and express themselves.

Love literature.

Ask questions easily.

Be attentive listeners.

Be independent readers.

Write for their own purposes.

Find meaning in literature.

In writing, children will:

Enjoy the writing experience.

Sequence events.

Write for a purpose.

Write in a variety of forms (nonfiction, original stories, journals, poems, letters).

Follow the steps of the writing process (pick a topic, brainstorm write a first draft, conference, edit and revise, publish, share published works).

Express ideas effectively.

Use punctuation correctly (period, question mark, exclamation point, quotation mark, comma, colon, semi-colon).

Use complete sentences.

Use appropriate grammar.

Construct paragraphs.

In reading, children will:

See themselves as readers.

Use a variety of strategies to derive meaning from text.

Distinguish between reading for information and reading for pleasure.

Make predictions and draw conclusions based on comprehension of story content.

Make comparisons between situations in literature and in life.

Recognize the value of reading in their lives.

Recognize and appreciate the development of characterization in fiction.

Read a variety of genres or kinds of writing such as fiction, poetry, or factual prose.

In speaking and listening, children will:

Begin to realize the benefits of clearly articulating their own point of view.

Develop verbal skills and confidence when speaking.

Use appropriate vocabulary.

Rely on language to resolve conflicts and solve problems.

Practice social conventions of speaking such as taking turns.

Learn to modulate voice, tone and volume.

Listen with focused attention.

General Goals for Mathematics

In mathematics, children will:

Show an interest in solving problems.

Develop confidence to try various strategies.

Show a willingness to risk being wrong.

Demonstrate number sense about numbers, large and small.

Estimate probability of outcomes in games of chance.

Use measurement to solve problems.

Recognize numbers up to the hundred thousands.

Regroup numbers up to 100.

Demonstrate an understanding of the relative size of numbers.

Perform addition, subtraction, multiplication, and division of numbers and demonstrate an understanding of the relationship between operations.

Collect, organize, and display data using graphs, charts, and writing.

Recognize, count, and use currency.

General Goals for Visual Arts

In visual arts, children will:

Develop their ideas visually and record their feelings and impressions.

Strengthen creative problem solving skills and judgments.

Stretch their imaginations through discussions and creative discoveries.

Develop skills of craftsmanship through the use of different medium.

Develop responsibility and purposeful work habits.

Acquire an appreciation of different talents and strengths of individuals.

Come to appreciate the unique aspects of different cultures through a variety of art experiences.

General Goals for Science

In the science program, children will:

Acquire a common core of science learning that centers on scientific thinking.

Demonstrate an understanding of the scientific process by observing, classifying, predicting, testing, assessing, communicating.

Initiate experiments or investigations to test their own ideas.

Ask questions and become creative in pursuing the answers.

Make connections between new and known information.

Apply creative solutions to scientific problems.

Become familiar with the basic concepts of physical, life and earth science.

General Goals for Social Studies

Social Studies encompasses the study of society and social concerns through history, geography, and civics. Children will:

Make group decisions by discussing and voting in order to begin to understand the political-legal decision making process.

Create maps of regional areas.

Construct models of significant national land formations.

Participate in the formulation of classroom rules.

Create historical time lines of their home, city or village.

Create family crests and understand the significance of national symbols.

Identify historical and meaningful sites in the community for study and exploration.

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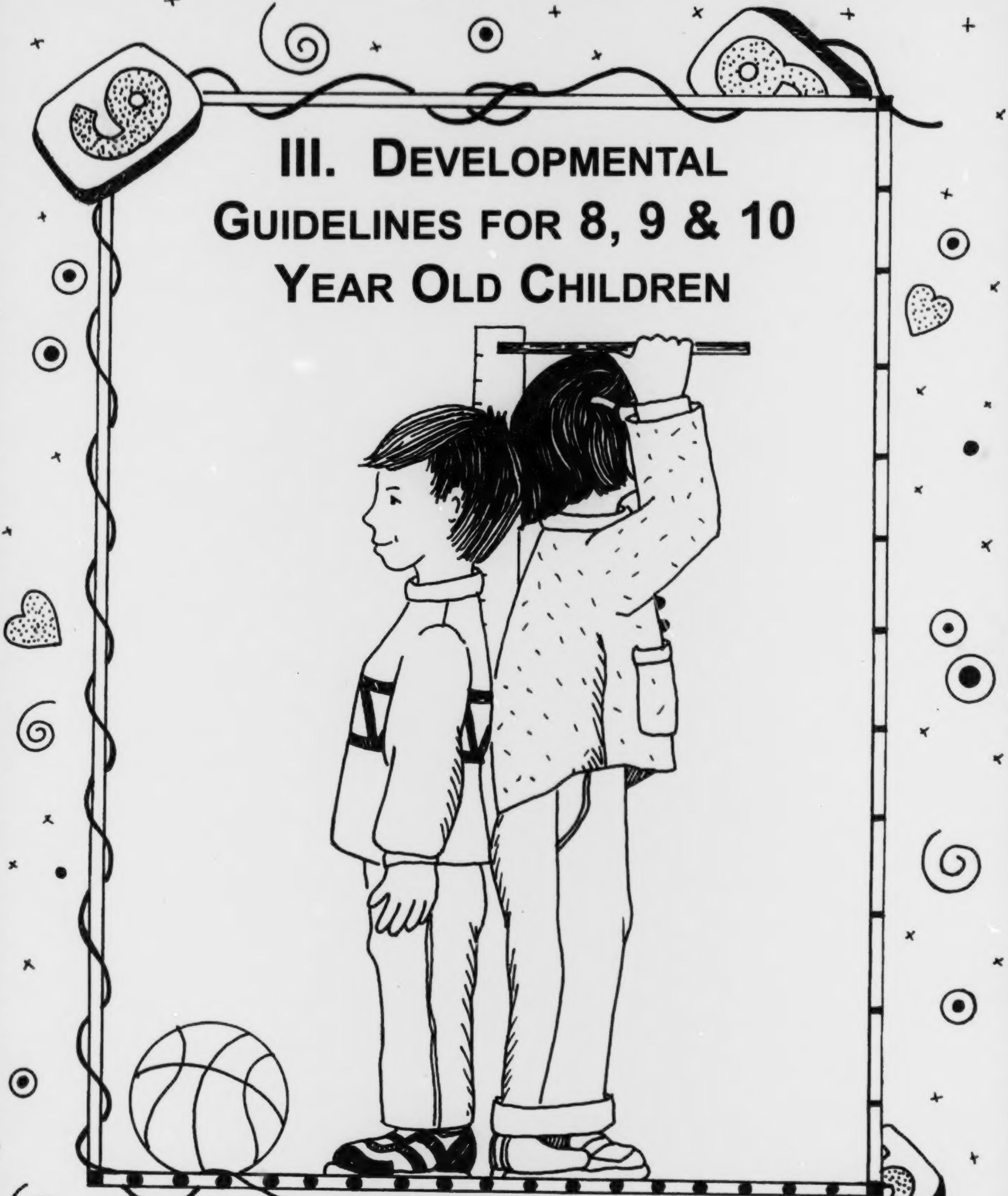
III. DEVELOPMENTAL GUIDELINES FOR 8, 9 & 10 YEAR OLD CHILDREN



III. DEVELOPMENTAL GUIDELINES FOR 8, 9 & 10 YEAR OLD CHILDREN

I am what I can make work.
Erik Erikson

Human development, during the ages of eight, nine, and ten can be described as the progression through a period of expansion to a fitting together or acceptance of competencies. From a Piagetian perspective, children at these ages have reached the developmental stage of concrete operations. The cognitive growth at this stage is characterized by the ability to consider two aspects of a problem simultaneously. Development shifts from the stage in which egocentric thinking dominates to that in which the mental skill of assuming other points of view and perspectives begins to predominate. In their social interactions, children of this age begin to consider not only what they are saying but the listener's needs as well. When they experiment with physical world tasks, such as conservation experiments, they consider not only the most visible changes but compensating changes also. Specifically, the thinking of children this age is no longer solely influenced by sensory perceptions. Instead, a more systematic logic influences their thought processes. The ability to coordinate two perspectives forms the basis of reasoning in both social and cognitive domains. Piaget sees the eight to ten-year-old as more stable, realistic, and organized than the younger child.

> *For Piaget, this change is not the result of the repression of emotions and dangerous wishes; rather it comes about because intellectually, the child has entered the stage of concrete operations. The child can now separate fact from fancy, can see different perspectives on a problem, and can work logically and systematically on tasks. Intellectually then, the child is in a state of equilibrium with the world and this contributes to his or her overall stability and composure.* (Crain, p. 266)

It is also at these ages that Vygotsky recognizes the development of what he has termed *inner language*. That is, according to Vygotsky's theory of learning, children use language internally as a thinking tool. The early, egocentric speech of previous stages becomes internalized and functions as a means of self-regulation. This is a period of calm and stability. In terms of instincts and drives, children begin to focus on themselves as part of a larger social order beyond the family.

The social psychologist, Erik Erikson believes that this is a distinct time of psychological growth. Children master important cognitive and social skills. Life presents a crisis between industry and inferiority for the eight, nine, and ten-year-old child. Now, children advance into society to learn useful skills and tools of the wider culture. Children are expected to attend school and learn the skills of reading, writing, mathematics and cultural studies. They are learning to do meaningful work, and *are developing the ego strengths of steady attention and persevering diligence* [1963, p. 259 Childhood and Society (2nd edition). New York: W.W. Norton & Co.]

They are learning to work and play with their peers. *The danger of this period is an excessive fear of inadequacy and inferiority* (1963, p. 260). Many of us can probably remember the hurts of failure in the classroom or on the playground. A particularly deep sense of inferiority may have various roots. Sometimes children have difficulty at this stage because they have not successfully resolved the conflicts at earlier stages. At other times, school and community attitudes may hinder the development of a sense of industry. All too often schools fail to discover and encourage the individual's special talents. *The successful resolution of this stage leads to the ego strength Erikson calls competence, the free exercise of intelligence and skill in the completion of tasks, unimpaired by excessive feelings of inferiority.* (Theories of Development 3rd. edition William Crain p. 255-256 New Jersey: Prentice Hall)

For Erikson (and the Freudians), the fantasies and fears of the younger child are temporarily buried during the latency stage, which lasts from about seven to eleven years of age. The child's interests expand outward in what Erikson calls the stage of industry. The child intently tries to master the realistic skills and tools of the culture. In general, this is a relatively calm period; children seem more self-composed. (Crain p. 266)

For Piaget, Erikson and Freud, children of eight, nine and ten years are in a stage of development which is outwardly focused and industrious.

The relevance of these theories for educators is significant when we apply them to classroom practice. When teachers attempt to understand children's behavior within the context of developmental stages, they broaden their appreciation of children as individuals whose growth occurs on a human continuum. Teachers use these theories as reference points to understand particular behaviors and decisions of children.

The following charts present growth patterns of eight, nine and ten-year-olds and developmental expectations for the classroom. They have been adapted from the book *Yardsticks for Children* (1994) with permission from the author, Chip Wood of the NorthEast Foundation.

The Eight-Year-Old: Growth Patterns

Physical

Speedy, works in a hurry
Full of energy
Needs physical release
Somewhat awkward
Attention span limited
Vision strong in near and far

Social

Gregarious, humorous
Likes to work cooperatively
Often tries to do more than abilities allow, overestimates abilities
Resilient; recuperates quickly from mistakes
Prefers same gender activities
Trouble with limits and boundaries
Friendship groups often include more children than at age seven

Language

Talkative
Listens, but so full of ideas cannot always recall what has been said
Exaggerates
Likes to explain ideas
Vocabulary expands rapidly

Cognitive

Engrossed in activity at hand; loves to socialize at same time
Likes group and group activities
Very industrious
Often works quickly
Concrete operations solidifying
Basic skills begin to be mastered
Begins to feel a sense of competence

The Eight-Year-Old in the Classroom

Vision and Fine Motor Ability

Acuity and control come together; appropriate time to focus on cursive handwriting

Pencil grasp should now be "adult"

Can copy from blackboard and handle increasingly complex (but not lengthy) assignments

Gross Motor Ability

Often a "growth spurt" – restless and needs lots of physical activity; short exercise breaks (even in the classroom) help concentration

Loves group games on the playground; gravitates toward same gender activities, so teacher should lead outdoor games for whole class (tag games, etc.)

Plays hard and often exhausted in short time; several short play breaks more productive than the long one

Cognitive Growth

Very industrious, but often exaggerates ability, has trouble knowing limits; teachers can shorten (rather than lengthen) assignments; success in small doses builds confidence

Loves to work cooperatively, most productive in groups; enjoys responsibility – though not always successful

Interest in process and product of school work; peers' assessment of work as important as teacher's

Work is usually well organized, though tends to be sloppy; needs teacher assistance with organizational strategies, especially on tasks such as math papers copied from textbooks

Growing interest in rules, logic; keen interest in how things are put together, how they work; interest in natural world and classification

Social Behavior

Classroom organization should feature desks in groups, or groups at tables; teacher should change groupings frequently through the year

Responds to class projects and traditions that build a sense of unity and cohesion

Gender issues become more important

Fairness issue; growing sense of moral responsibility beyond self; arguing

Respond to studies of other cultures; stories that concern fairness, justice

The Nine-Year-Old: Growth Patterns

Physical

Increased coordination
Pushes self to physical limits
Fatigues easily
Numerous injuries
Somatic complaints
Tension outlets such as nail-biting, hair twisting, lip-pursing

Social

Highly competitive
Self-aware
Impatient
Worrier; anxious
Aloof
Complainer; fairness issue
Sees adult inconsistencies and imperfections
Critical
Can be sullen and moody
Individualistic

Language

Descriptive
Loves vocabulary and language play and information
Baby-talk sometimes re-emerges
Use of hyperbole
Age of negatives: "I hate it," "I can't," "boring," "yeah, right"
"Dirty" jokes
Graffiti

Cognitive

Industrious and self-critical
Dawn of "bigger world"
Less imaginative
Intellectual curiosity
Ability to deal with multiple variables emerges
Trouble with abstractions – large numbers, periods of time or space

The Nine-Year-Old in the Classroom

Vision and Fine Motor Abilities

Increased coordination leads to greater control, interest in detail; cursive handwriting can be fully mastered; watch for overly tight pencil grip

Practice with a variety of fine motor tools and tasks useful (weaving, knitting, carving, drawing)

Can copy from blackboard, recopy assignments, produce beautiful "final drafts"

Gross Motor Ability

Pushes to the limit – loves to challenge himself individually, races against each other or against clock

Physical control an issue; knowing boundaries and staying within them a physical and social issue

Boys love to rough-house – "puppy stage"

Age of physical complaints, frequent injuries – some real, some exaggerated

Cognitive Growth

Can work in groups; arguing, disputes about facts, rules, directions may take longer than actual activity

Homework should be reasonable, related specifically to next day's work; asks, "Why do we have to do this?"

Looking hard (often anxious) for explanation of facts, how things work, why things happen as they do; good age for scientific exploration

Reading to learn, instead of learning to read

Takes pride in finished work, attention to detail; enjoys the product, but may jump quickly between interests

Social Behavior

Likes to work with partner of choice – usually same gender; cliques may begin

Fairness issues increase; can be deadly serious about competitiveness; competition in the curriculum, gym classes, etc. should be presented with a sense of fun, lightness, humor

Likes to negotiate – age of "Let's make a deal"

Worries (school work, the world) need teacher patience and understanding; use clear language when giving directions, setting expectations is very important; avoid sarcastic humor, children are their own worst critics

Second chances are important, has a tendency to give up; encourage and build up fragile sense of ability to accomplish tasks; exasperation by teacher or whining voice leads to more complaints, laughing with nine-year-olds is best

The Ten-Year-Old: Growth Pattern

Physical

Large muscle development
Needs outdoor time and physical challenge
Handwriting often sloppier than at nine
Snacks and rest periods are helpful for growing bodies

Social

Fairness issues peak and can be solved
Quick to anger, quick to forgive
Generally content
Works very well in groups
Enjoys both family and peers
Likes clubs, activities, and sports
Usually truthful; developing a more mature sense of right and wrong
Good at solving social issues

Language

Better listener than at nine, actively receptive
Voracious reader
Expressive, talkative, likes to explain
Cooperative and competitive
Friendly, generally happy

Cognitive

Memorization is a productive learning method now
Increased ability to abstract
Likes rules and logic
Classification and collections are of interest; likes to organize
Able to concentrate, read for extended periods
Good problem solver
Proud of academic products

The Ten-Year-Old in the Classroom

Vision and Fine Motor Abilities

Able to focus well, concentrate on task at hand; integrates spelling, dictation, penmanship well, but precision may be lacking

Enjoys tracing and copying as fine motor skills strengthen

Use of tools (compass, protractor, ruler, templates) can be introduced successfully, with time to practice

Gross Motor Ability

Needs a great deal of physical activity, large muscle development; upper body strength generally undeveloped; extra recess or playtime a must or energy will spill out into inappropriate behavior

Group games very popular: relay races, whole class outings, team sports, and other organized activities

Cognitive Growth

Highly productive with school work; usually conscientious with homework; values attention to form, structure, directions, organization

Actively receptive learner, memorization an important teaching strategy; interested in geography, facts and statistics, choral reading, singing, poetry and plays are popular

Classification, seriation, exactness are strengths – collections, science and projects are productive learning methods; this age is the height of concrete organizational skills

Social Behavior

Cooperative group activities are successful, whole class cohesion, cooperative learning; good age to begin to train in conflict resolution techniques, peer mediation

Friendship and fairness issues constantly being played out; use teams, groups games, competition to allow for practice in social interaction

Generally satisfied with ability, happy and flexible; can be challenged by teacher to reach out to others, good age to start tutoring younger children; enjoys community service projects

Enjoys being noticed, rewarded for efforts

Quick tempers may lead to physical outbursts and tears, but usually are solved quickly and easily

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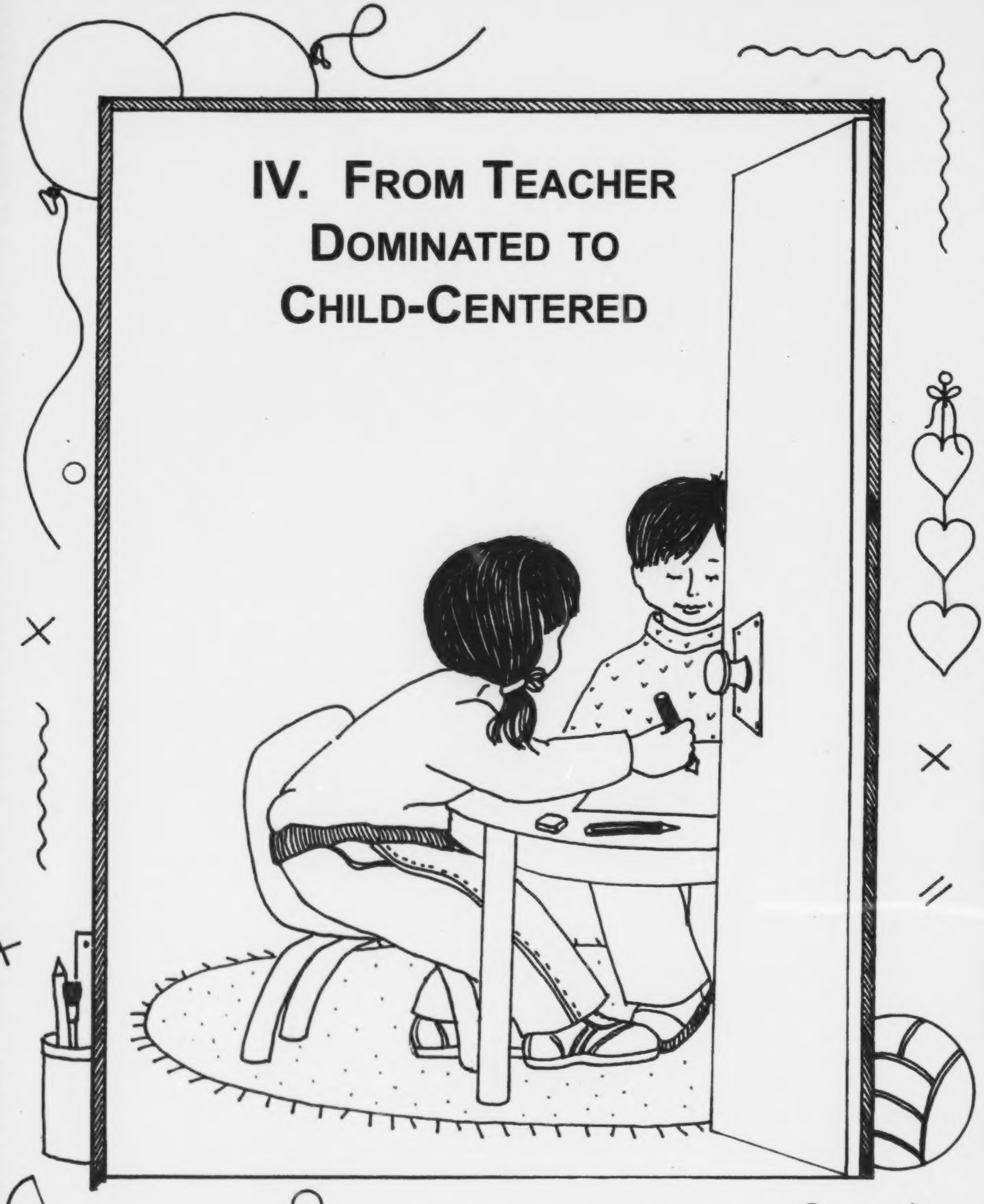
IV. FROM TEACHER DOMINATED TO CHILD-CENTERED



IV. FROM TEACHER DOMINATED TO CHILD-CENTERED

Be ashamed to die until you have won some victory for humanity
Horace Mann

What do most classrooms world wide have in common? Teacher talk dominates the room. Research by Jon Goodlad (1984) verified that the regular pattern of teacher disseminated information is followed by the general expectation of student repetition of the specific information. If we imagine a chart showing the flow of dialogue in a classroom, the arrows emanate from the teacher to a particular student and back in single rays. Most of the arrows point to or away from the teacher and rarely from student to student or among students. Consider the arrangement of a classroom that is dominated by teacher talk. In most, the teacher's desk is the most prominent feature, situated in the front of the room. Students sit in rows looking ahead at the teacher. The walls are relatively plain so as not to distract attention from the teacher. What does this picture say about the process of teaching and learning that occurs daily throughout the world?

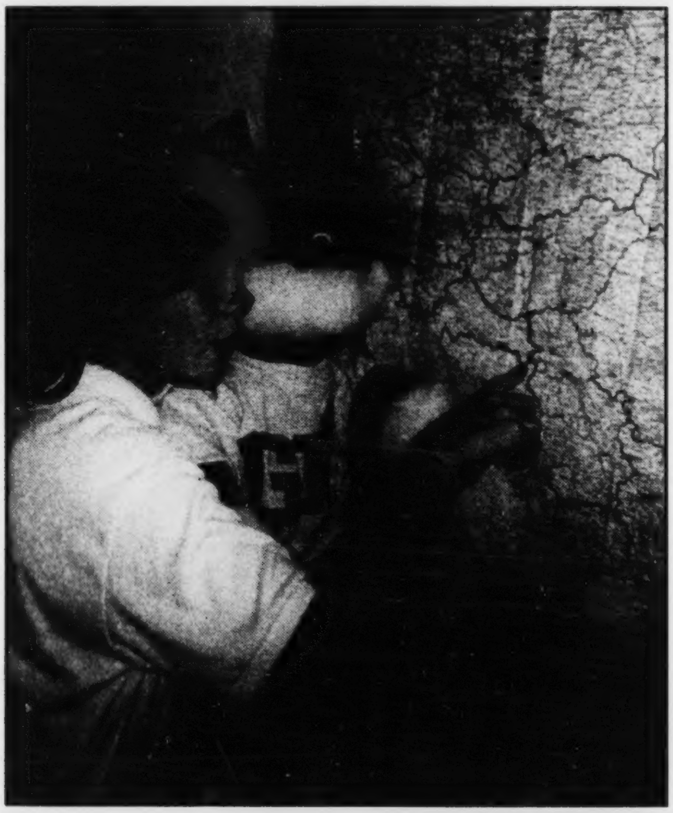
The Step by Step Program adheres to an individualized approach to teaching that respects each child's efforts and abilities to construct his or her own learning. The construction of understanding is the core element in the highly complex process of learning. Teachers who share this point of view keep the child at the center of the learning. They work to create environments that reflect this perspective. *Educators must invite students to experience the world's richness, empower them to ask their own questions and to seek their own answers, and challenge them to understand the world's complexities* (Brooks, 1993, p. 5). Through this program, we present a new picture of classrooms and schools. One that reflects the possibilities of the world and the potential of each child. We see classrooms where the construction of knowledge is valued and facilitated. These classrooms that are settings for exploration, inquiry, cooperative problem solving and thoughtful dialogue. These are classrooms in which teachers invite children to search for understanding, to become comfortable with ambiguity, and to work responsibly for answers to their questions. These are child-centered classrooms.

The question then becomes: How can schools and teachers be child-centered and successfully prepare children for their adult years? We must adopt John Dewey's point of view that education is a process of living. We must understand the dynamics of learning and develop classroom practices that honor those dynamics.

> *When the classroom environment in which students spend so much of their day is organized so that student-to-student interaction is encouraged, cooperation is valued, assignments and materials are integrated and students have freedom to pursue their own ideas, children become more willing to take risks and approach their work with a willingness to accept challenges to their current understandings. Such teacher role models and environmental conditions honor children as emerging thinkers* (Brooks, 1993, p. 9).

Such environments are child-centered.

In order to more clearly depict our vision of child-centered classrooms, the following pages present a comparison between a teacher dominated and child-centered program with regard to: philosophical assumptions, program content, the teacher's role and strategies, family involvement, and assessment. Portions of the folowing have been adapted from *In Search of Understanding: The Care for Constructivist Classrooms*, by Martin and Jacqueline Brooks.



	Teacher Dominated	Child-Centered
Philosophical Assumptions:	School is preparation for life.	School is part of life.
	Knowledge is something teachers provide for children.	Knowledge is constructed by the child.
	Schooling is a task to be endured.	Schooling is challenging and joyful.
	Focus is on education as a product.	Focus is on education as a process.
	Learning happens in a linear progression through mastery of accumulated skills and facts.	Learning is viewed as an ever broadening spiral with content, depth, and breadth.
	Students are passive absorbers of information and authority.	Students are actively involved problem solvers and planners.
Program Content:	Curriculum content is presented in discreet subject areas.	Curriculum content is integrated as children make connections.
	Curriculum is determined and developed by external criteria and experts.	Curriculum is determined by student interests and curricular requirements adapted by teachers for implementation.
	Decision making is hierarchical and centrally based.	Decision making is shared by informed constituencies.

	Teacher Dominated	**Child-Centered**
	Curriculum is designed to encourage conformity to group expectations both in social behavior and levels of academic achievement.	Curriculum is designed to develop individual competence and positive experience toward learning.
	Culture and other individual differences are ignored as children are expected to adapt to the dominant culture.	The curriculum recognizes the reality of a diverse, multicultural world in order to better prepare children for the future.
	Content activities are based on textbooks and workbooks.	Content activities are based on primary sources of data and manipulative materials.
	Emphasis is on learning basic skills.	Emphasis is on understanding important concepts.
Teacher's Role and Teaching Strategies:	Teachers are the sole source of information.	Teachers are facilitators and guides to learning.
	Teachers are seen as having completed their learning.	Teachers see themselves as learners along with the children.
	Teachers present information through lecture, workbooks and worksheets.	Teachers create learning situations based on direct experience, social interactions, and inquiry.
	Teachers' questioning techniques are focused on right/wrong answers or closed questions.	Teachers solicit the children's questions and prod their thinking through open-ended questions.

	Teacher Dominated	**Child-Centered**
	Skills are taught as goals to be attained.	Skills are presented as tools and related to content.
	Teachers are responsible for class behavior and are viewed as the authority in the classroom.	Teachers and children together establish rules for behavior which emphasize personal responsibility.
	Teachers generally behave in a didactic manner, giving information to students.	Teachers behave in an interactive manner, mediating the environment.
	Teachers see students as blank pages onto which information is inscribed.	Teachers see students as thinkers who are developing theories about the world.
	Students primarily work alone.	Students work in pairs and small groups.
Family Participation	Parents are seen as outsiders and are uninvolved.	Parents are seen as the first teachers and partners.
	Communication with families occurs primarily when there is a problem.	Communication with families starts at the beginning of the school year and focuses on collaborative goal setting and planning for each child.
	Parents have a prescribed day to visit the school.	Parents are welcome in the school at any time.

	Teacher Dominated	**Child-Centered**
	Parents' involvement with school work is relegated to oversight of homework.	Parents are depended upon as resources to complement class studies.
	The community is viewed as separate from school.	The community is an important resource for learning.
Assessment/Evaluation:	Assessment is done at prescribed times on an annual basis.	Assessment is ongoing and cumulative.
	Is often in a set format, i.e., multiple choice.	Assessment employs open-ended formats.
	A set grade is based on a single setting.	Summary assessment draws upon a variety of settings.
	Assessment instruments are norm-referenced.	Assessment instruments are criterion referenced.
	Evaluation is totally controlled by the teacher.	Evaluation involves child in the assessment process.
	Evaluation is determined by grades.	Evaluation is progress oriented.
	Evaluation is competitively based.	Evaluation is seen as individual improvement.
	Success is derived from recall and memory; it is specific to a time and place.	Success is determined through application over time, through collaboration.

Teacher Dominated	**Child-Centered**
Intelligence is measured through linguistic and logical/mathematical abilities.	Intelligence is recognized as including the arts and is measured in real life problem solving.
The correct answer is sought by the teacher as a validation of student learning.	The student's point of view is sought in order to understand a child's current perceptions for use in subsequent lessons.
Assessment is viewed as separate from teaching.	Assessment is interwoven with teaching.

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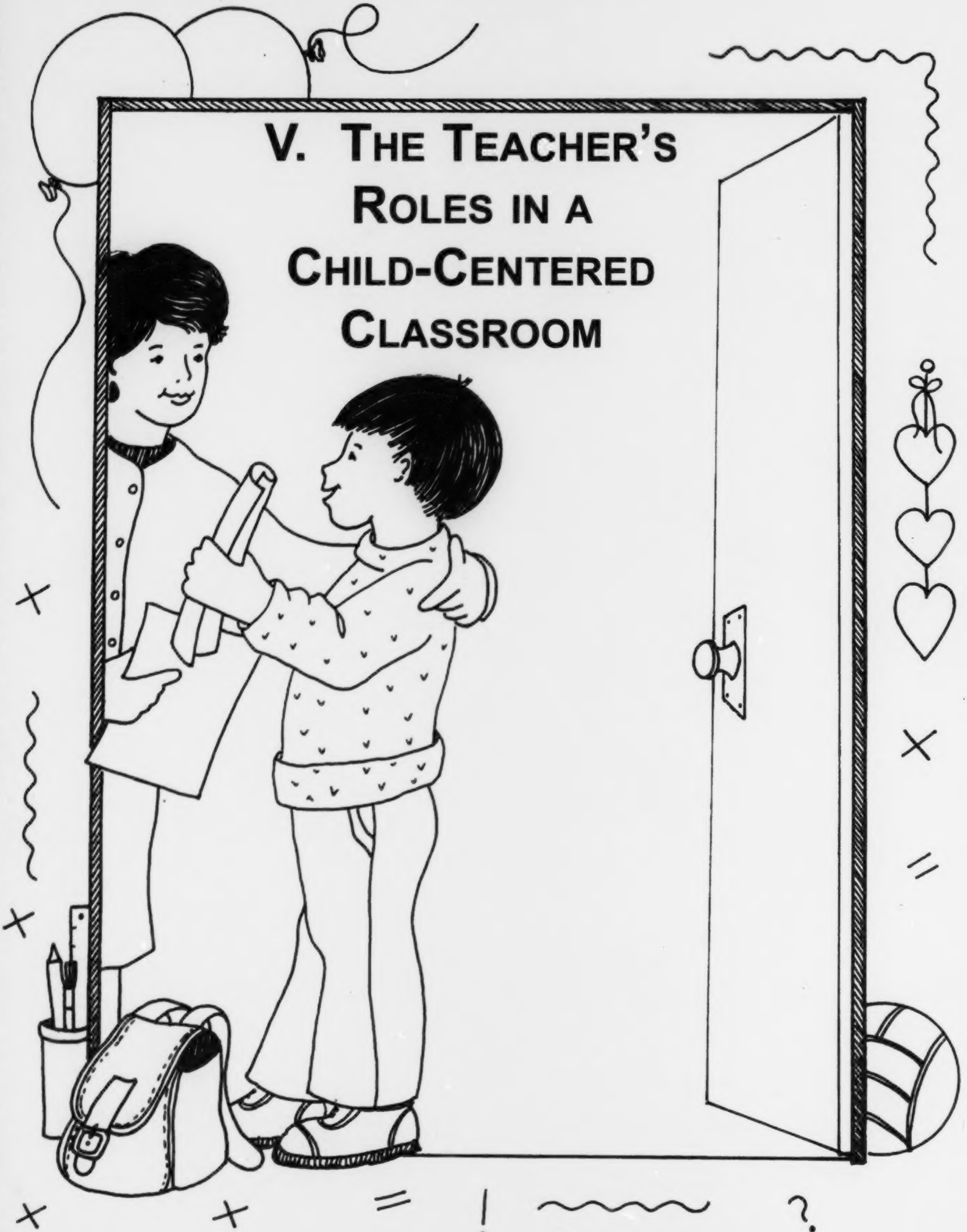
V. THE TEACHER'S ROLES IN A CHILD-CENTERED CLASSROOM



V. THE TEACHER'S ROLES IN A CHILD CENTERED-CLASSROOM

What kind of school plan you make is neither here nor there; what matters is what sort of person you are.

Rudolf Steiner

As teachers, it is our responsibility to provide an intellectually stimulating and emotionally supportive environment for all children. We do this in many ways throughout the day, remembering that each moment is a teachable moment, whether it be a class meeting, a small group discussion, or an individual conference. The teacher has many roles in the Step by Step classroom. She is:

- A decision-maker
- A facilitator of learning
- An observer and assessor of children's learning
- A role model

These roles are like responsibilities; they are part of what a teacher must do in a child-centered classroom to meet the children's needs and promote their development. These roles empower teachers. When teachers understand these roles and feel comfortable with them, their teaching will be strong, dynamic, creative and child-centered. For many teachers, these are new roles. They have to be learned and practiced. In time, these roles begin to feel quite natural and familiar.

In the sections that follow, each role will be discussed and examples of what teachers say and do in classrooms will be given. As you read these sections, think about yourself as a teacher and how you can strengthen and expand your roles.

The Teacher as Decision Maker

In child-centered classrooms, teachers are decision makers. They make many decisions every day that affect what children learn and how they feel about themselves as learners (Jablon, 1992). They make decisions about:

- The physical environment – The physical environment is the laboratory for children's learning. How the room is set up, which centers exist, where they are placed, how the tables and chairs are organized, what is up on the walls are decisions teachers make to support children's learning.
- The materials – The materials are the tools of the curriculum. Teachers decide which books are available, what science equipment is in the center, which math games are on the shelves, and which ones will be saved for another time.
- The daily schedule – How much time is allotted for different learning experiences and whether there is flexibility in the schedule are decisions teachers make. When teachers decide to have a morning meeting every day, they indicate that building a community is part of their curriculum.
- The community of learners – Helping children learn together is part of curriculum planning. When teachers allow children to work on group projects, instead of working alone all the time, then children are learning about cooperation and how to solve problems together.

In making these decisions, teachers are developing curriculum. As they plan the room, put out materials, set up a schedule, and create a community, they are making decisions about how and what children are learning. Everything that teachers do, and all the decisions they make are curriculum-related because they are related to learning!

But teachers also make more specific decisions about the subject matter, the topics to cover, the content of math, science, social studies, reading, and writing. They also decide how they can integrate the curriculum and connect the subjects. In addition, they also decide how to teach basic skills and stimulate creativity.

In most schools, teachers must follow a set curriculum from the district or central offices, but they can decide how to best meet the curriculum goals. For example, if the goal is to learn how to write a letter to someone, a teacher can set up a message center in the classroom so the children can write letters to each other. If the children must learn about their community, then the teacher can decide to take a class visit to the nearby post office; in a town near a river, the teacher decides that the class will study river transportation as part of their community.

In the past, teachers made few decisions about their classrooms. Even though the classrooms were referred to as teacher-dominated classrooms, teachers really had very little say. Maybe they could make decisions about which students sat next to each other or which songs they would teach the children, but these were not far-reaching or critical decisions that influenced children's learning. The important curriculum decisions were left to the textbook publishers, supervisors, administrators in the central offices, or politicians.

In all classrooms, teachers are the ones who know their students best, but in child-centered classrooms, they act on that knowledge and make decisions. They decide what is the best way to reach each individual learner in their class. When teachers observe their children and see how the standard curriculum often fails them, they have the right and responsibility to make curriculum decisions. This means that teachers have to believe in themselves and see themselves as the experts on their classroom. At the same time, they have to uphold the curriculum goals that are passed on to them. In child-centered classrooms, teachers are empowered as professionals in a way they have not been before. A second grade teacher in the United States explains how she came to feel differently about her role when she changed to a more child-centered approach:

> *Many teachers are trained to be ignorant, to rely on the opinions of experts or superiors, rather than on their own judgment. ...I had to learn to trust my own instincts and intuition about my ability to judge what is best for the students in my care.* (Desjean-Perrotta, 1996, p. 4).

Learning how to make decisions and trusting oneself to make good decisions is a process. It will not happen overnight. Many teachers find it easier to begin making decisions in one area first, whether it is the physical environment, materials, schedule, social relationships, or curriculum content. But as teachers begin a step at a time, they find that their initial success prepares them for making more decisions that benefit the learners in their classrooms.

The Teacher as Facilitator of Learning

In child-centered classrooms, teachers are facilitators of learning. They help, guide, stimulate, and share responsibility for learning with the students. The teacher's role as facilitator is not a new idea. It is described by Vygotsky as he refers to the zone of proximal development and scaffolding. When teachers provide a scaffold by asking a question or making a comment, children are guided to more advanced thinking (Berk & Winsler, 1995).

What does teacher facilitation look like? One teacher describes the process of facilitation. Teachers no longer assume primary control over the learning that occurs; students have to share in the responsibility. It is as if teachers climb into lifeboats and float alongside their students; they carry emergency equipment, sustenance, and are constantly vigilant, offering encouragement. No student is left alone to sink or swim, rather the teacher is nearby and ready to facilitate.

Here are some examples of how a primary teacher in the Step by Step Program "floats in the lifeboat" alongside her students:

- Nikolai thinks he has the right answer to a math problem but he really has made a mistake. Instead of telling him that his answer is wrong or supplying him with the right answer, she asks him, "How did you get this answer? Show me what you did." She wants him to discover his own error.

- Several children are having an argument about cleanup responsibilities. The teacher asks, "How can you work it out so that it is fair?" She helps the children learn to solve problems themselves.

- It is springtime and the children are excited about the buds appearing on the trees. The teacher puts three twigs with buds on them in the science center and next to them, writes this task on a card: "Observe these twigs. Write down what you notice about them. Draw a picture of them." She has noticed the children's interests, provided materials, and set up a learning activity.

- Tanya is reading her story to the class. She misreads a word, but corrects herself. The teacher tells her, "I saw you correct yourself because the first word didn't make sense. That was good thinking."

- The class is discussing light and shadows for a science project. A child asks, "My shadow is sometimes big and sometimes small. Why?" Instead of answering his question, the teacher decides to ask all the children to think about this matter. She says to them, "Who else has noticed that their shadows change size?" Many children raise their hands and want to talk. A lively class discussion ensues.

In a child-centered class, the teacher has responsibility for making critical decisions and for finding ways to help all the children learn. She is still the adult in charge who must make sure that the classroom is an interesting, stimulating, supportive, and safe place for the children. But what is different in child-centered versus teacher dominated classrooms is that teachers make decisions based on their knowledge of the developmental level, the interests, and the needs of the children in the class. Teachers facilitate learning, they do not control it.

There are many ways in which teachers act as facilitators in child-centered classrooms. For some teachers, being a facilitator comes very naturally; for other teachers, it takes a lot of practice and thinking about what they say and do. For all teachers, it is helpful to appreciate how broad and complex the facilitator's role is. Teachers facilitate children's learning by:

- Asking questions
- Responding to children's questions
- Helping children reflect on their thinking and learning
- Providing resources

These points will be explained and illustrated in the sections that follow. As you read, think about yourself as a teacher and what you say and do to promote learning in your classroom.

Asking Questions

Teachers ask questions for many reasons. Research shows they often ask test questions that are designed to find out if children know the right answers. When a teacher asks, "Why do leaves turn brown and fall off trees in autumn?" or "What did the main character in the story do next?" or "How many millimeters are in a centimeter?"or "Are pigs domestic animals?," the children are expected to know the answer and may not even attempt an answer unless they are sure. Teachers ask these kind of questions in order to find out what children know or if they have mastered the material. In a child-centered classroom, teachers sometimes need to ask these kind of questions. These are called closed questions. They have a right and a wrong answer.

Open Questions

Closed questions are not the only kinds of questions teachers ask in a child-centered classroom. The teacher uses open questions to provoke thinking and stimulate learning. Open questions encourage children to express their ideas and their feelings and to promote children's exploration and investigation. Open questions sound like this:

What do you notice about the leaves on the trees?

How did you get your answers?

What are some of the jobs we need to have in the classroom?

Why do you think the boy in the story felt sad?

Which domestic animal is your favorite?

How does your family celebrate your birthday?

These questions do not have one right answer. They allow any child to respond; they provide insight into children's thinking processes. It is very important for teachers to ask open questions throughout the day as children are reading, writing, computing, studying science, and social studies, art or music. Open questions can be used to talk with children about their social relationships with one another or about the classroom community or about their lives at home. Open questions allow children to say what is on their minds and to feel secure in their answers. Open questions help students articulate their own point of view and understand those of others.

Closed questions can sometimes be turned into open questions, allowing teachers and children to become more engaged in the learning process. For example,

Closed	**Open**
"How much has your plant grown?"	"What has happened to your plant since you planted it?"
"How many sides does a square have?"	"What do you notice about this shape?"
"Do you play the piano at home?"	"What do you like to do at home?"

With practice, teachers and children can learn to re-phrase their questions and ask more open than closed questions.

Person-Centered Questions

Another way to elicit children's thinking and to avoid asking for the "right answer," is to distinguish a subject-centered question which asks directly about the subject matter and a person-centered question which asks for the child's ideas about the subject matter (Harlen, 1988). Subject-centered questions sound like this:

> Why are these nails attracted to the magnet?
>
> Why did the girl in the story visit her grandmother?
>
> Why are the river boats in the harbor?

These questions cannot be answered unless a child knows the reasons or thinks he does. The person-centered versions are different; they sound like this:

> Why *do you think* these nails are attracted to the magnet?
>
> Why *do you think* the girl in the story visited her grandmother?
>
> Why *do you think* the river boats are in the harbor?

The simple addition of the phrase *do you think* opens the questions up to any child who has been thinking about these ideas and has some ideas to share, even if they are incorrect. When teachers ask person-centered questions, they can learn about children's reasoning. Person-centered questions invite *all* children to participate in discussions, helping them to make sense of their world.

Responding to Children's Questions

In classrooms where teachers ask questions, children, too, will ask questions. Their questions are critical to their learning; a second grade teacher in the United States notes, *I learned that children's questions are my window into their understanding, thinking, and perceptions and are much more revealing than any pre-test I could give* (Beck & Leishman, 1996). Many teachers think they must answer every question. However, there are many different ways to respond to children's questions. In fact, in child-centered classrooms, even if a teacher knows the answer, she may decide it is better to turn the question around to stimulate the child's thinking.

> Lise is looking at photographs of butterflies in the library center. She asks the teacher, "Why are butterflies different colors?" The teacher responds, "That's a really interesting question. What do you notice about the different colors? You can use the magnifying glass to help you see up close." Lise gets the magnifying glass from the science center, looks carefully at the photos, and begins to write down what she notices.

Although the teacher knows the answer (the different colors provide camouflage and protection for the butterflies), she does not want to give a scientific explanation to Lise. She knows that Lise will not really understand the concepts unless she actively constructs her own understanding through investigation and exploration. What the teacher has done is listen to Lise, acknowledge her interest, encourage her curiosity, suggest materials, and support her independence as a scientist/learner.

Sometimes teachers do not know the answers to children's questions. While most children think that their teachers know everything, the truth is that teachers, and all adults, do not have all the answers. If it is a factual question, a teacher can respond honestly and say, "I do not know. How can we find out?" Here, the teacher becomes a learner along with the child and participates in the process of inquiry and risk-taking. Sometimes teachers worry that if they do not know an answer, they will lose the respect of the children and parents. Maybe their supervisors will judge them to be poor or incompetent teachers. But this should not happen. What matters the most is that teachers are willing to learn.

Some questions are so broad and philosophical, they really have no answers. Even the wisest person can not offer a definite and final explanation. These are often "why" questions, like "Why are people so mean and start wars?" "Why do we have bugs?" Teachers have to listen to and appreciate the question. They can ask for clarification: "What do you mean? Tell me more about what you are thinking." Sometimes, then, the child's question becomes one that has an answer. But if not, the teacher can admit that there is no answer and add, "People have been wondering about that and writing about it for a long time."

Helping Children Reflect on Their Learning

When learners stand back and reflect on their learning, they sometimes see things in a new way and get a better understanding of themselves as learners. By providing opportunities throughout the day, and by modeling reflection, teachers vastly enrich the learning of children in their class and help them become more thoughtful learners. In child-centered classrooms, teachers plan this kind of reflective experience for children: journal writing, group meetings and discussions, use of learning centers, and curriculum projects.

Journal Writing

In many classrooms, journal writing is an essential part of the day. Some children have several journals, including a reading journal, math journal, and social studies journal. Students may do their work in these journals, like solving a page of math problems or answering questions about a story they just read. But there is also space in the journal –at the bottom of the work page or in a separate section of the journal – for children to write about the process of learning. When the classrooms have extra paper or when children can have an extra journal or notebook, they may record their thoughts there.

Sometimes teachers tell children which topic to write about; sometimes children choose. They write about only one topic at a time. Their topics might include:

> When I was reading I wondered...
>
> This story made me think about...
>
> Something new I learned ...
>
> When we visited the post office I noticed...
>
> It was important to me that...
>
> The hardest part about working in a group is...
>
> What I understand about my math (social studies, science) work today is ...
>
> What I don't understand is...

Depending on the curriculum, other topics can be chosen. It is important that the topics be phrased in an open-ended and person-centered fashion so that each child can write about what he or she thinks without fear of being wrong.

Group Discussions

Class discussions are another time when teachers facilitate children's self-reflection. Children can be encouraged to talk about their behavior in the classroom, their attitudes, and their academic work. But in order for a group discussion to be productive, and not chaotic, overly exciting, or boring, the teacher must set a positive tone and ensure the attention of the children. There are key decisions that will affect the quality of the discussion. Here are some guidelines to follow (Harlen, 1996):

- *Choose an appropriate location.* Make sure there is enough room for the children to sit comfortably on the floor or on chairs. Children who need more guidance from the teacher are seated near her. The teacher is a part of the group too and stays as close as possible to the children's level. Materials that might distract the children are out of reach. If the teacher writes down the children's words as they speak, everyone can see what the teacher is doing (and thus, learn about how to write, what words mean).

- *Set clear expectations.* Sometimes children need to be reminded of what is expected of them. A second grade teacher began a group meeting by first asking her class, "Who remembers what we need to do to be good listeners?" Children made comments like, "Look at the person who is talking," "Do not interrupt." If there is a focus of discussion, like zoo animals or my grandmother's garden, then announce it to the class so the children can try to remember to stay on the topic.

- *Think about the timing.* There are many appropriate times to have discussions. They can be at the beginning of a curriculum project in order to stimulate interest and find out what children already know. They can be at the end of the project, to review and discuss what has been learned. They can be ongoing to give children a chance to share their emerging ideas and questions. Sometimes, a teacher decides to have an "emergency meeting" for example, when she needs to discuss why materials in the science center are being broken.

- *Be aware of the length of the meeting.* At the beginning of the school year, children can probably participate in a class meeting for 15-20 minutes. As they get used to it, the meetings may go on for 35-40 minutes, as long as their interest is maintained.

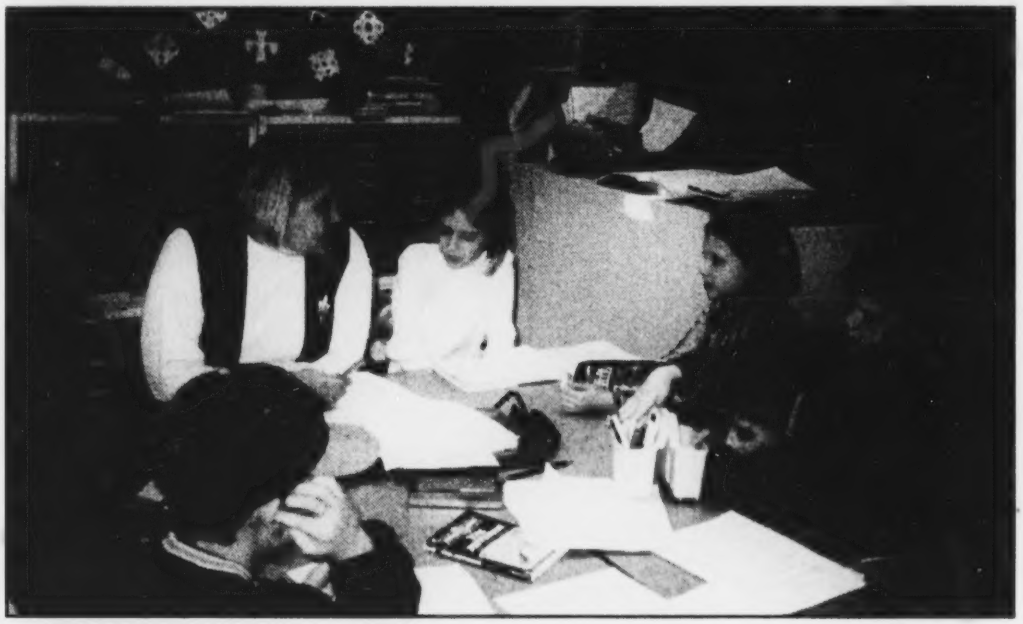
- *Provide closure*. It is important to know when to stop a meeting or discussion. The children will signal if they are restless or distracted or bored. If the discussion reaches a conclusion, then the teacher can end the meeting. She might close it by saying, "Here are some questions to think about before we meet again..." It is helpful to give a warning about time before the end of the meeting: "We have time for three more people to speak. Everyone else will have to wait until our next meeting tomorrow."

- *Encourage participation*. Too often, teachers put themselves at the center of class discussion instead of teaching the children to share ideas with one another. The teacher ends up making all the comments or asking all the questions when a child speaks. Children have to be helped to listen and respond to one another. The teacher can encourage more participation by saying "Who else has ever thought about this idea?" or "Boris has an interesting idea. Who has a different idea?"

There are so many interesting topics for class discussion! Children can talk about themselves as learners. The same topics used for journal writing can be discussed in a group. A class has been studying map-making and small groups have each made a map of their school. The teacher, Mr. R., begins a class discussion by asking the children to reflect on their experience, "What was it like for you to make a map of the school?" Some children explain that it was hard to work together in a group; others say they didn't know how to indicate certain building features. After some discussion, he asks another question to help them evaluate what they learned, "What else do you need to learn about making maps?"

In a class where the children are learning to read and spend a lot of time looking at books, the teacher gathers them together for a group discussion. Every day she starts off the discussion with the same question, "What did you learn about yourself as a reader today?" What a wonderful question. It helps children think about the strategies they are using, their attitude toward reading, and the kinds of materials they are reading. One day, when the children had been looking at science and social studies books, the teacher asked a second question, "What did you learn about yourself as a *non-fiction* reader?" Depending on what the children are learning about, other variations of this questions could be asked, "What did you learn about yourself as a mathematician? A scientist?"

Group discussions of curriculum topics are important opportunities for children to exchange ideas, clarify concepts, and ask questions. The teacher's role is to guide the curriculum discussion yet be flexible so that unexpected ideas can emerge from the children. The teacher must have an idea of what the purpose of the discussion is or the discussion is likely to wander because students at this age are interested in many different ideas and like to talk. So, the teacher's role is to lead the children without being restrictive. Usually, the entire class is involved in a curriculum discussion so that all the children have an opportunity to speak and to hear others' ideas. The group discussion also reinforces the sense that "all of us in the class are a community of learners."



Sample Discussion

Here is an example of how teachers lead a whole class discussion about the social studies/science curriculum. The eight and nine-year-old children in one class have been studying the Arctic and learning about the land, the people, and the animals. There are many books on the Arctic displayed around the room and many items posted on the walls and boards indicating that the Arctic is the curriculum focus:

- Photos of the Arctic landscape and brief descriptions of tundra, etc. are displayed.

- The children's ideas about the Arctic are written down on a large sheet of paper. The title is *What We Think We Know about the Arctic*. Children's ideas might include: it's the coldest area in the world; all people live in igloos (even though some of the ideas are inaccurate they are written down).

- The children create a long list of words associated with cold, such as *freezing, mittens, sled, slippery*. These words can be used in their writing.
- An ice chest is labeled Arctic Artifacts and includes toy animals the children have brought from home such as polar bears, reindeer, a pair of snow shoes, a fur hat, photos and articles about Arctic explorers.

Yesterday, the teacher read a book about glaciers to the class, and this morning, they are talking about glaciers. Twenty-four children sit in a circle on the floor. Their teacher is seated on a chair in front of them and a parent volunteer sits with them. Next to her is a large pad of paper with the word *Glaciers* written on it. As the children speak, the parent writes down their main ideas. Both adults participate in the discussion. It takes about one half-hour. (The class dialogue is condensed below; the numbers indicate that different children are speaking.)

The teacher helps the children get settled.

Teacher: *Sometimes it's hard to sit next to a friend and not get distracted. If you need to move in order to pay attention, please do that now.*

Teacher: *Who can remind us of anything you learned about glaciers?*

She calls on children who raise their hands.

Children talk about how the glaciers move and how big they are.

Teacher: *How are glaciers formed?*

Child 1: *Snow forms them.*

Teacher: *Say more. How can we describe this process?*

Child 2: *It's like a snowball, all packed together.*

Child 3: *A glacier is a river of ice.*

Teacher: *Why do you think that's such a good name for it?* (When no one responds, she asks the question another way). *What about a glacier* *is like a river?*

Child 4: *It moves and doesn't stay still.*

The parent brings an ice cube from the refrigerator into the classroom.

Teacher: *I have an example to show you about how glaciers move.*

She shows them the ice cube and demonstrates how it slides on a smooth flat surface such as a wooden block because of the melting water on the bottom.

Child 5: *That's like the meltwater underneath the glacier.*

Teacher: *Yes. What do you think will happen if I tilt the block?*

Child 6: *It will move faster.*

The teacher does it and all the children see that the ice cube moves faster.

Teacher: *What makes some glaciers go faster than others? What do you think?*

Child 7: *If there is more meltwater.*

Child 8: *If it's bigger.*

Teacher: *What do you mean? Bigger in height or in width? Show me with your hands.*

Child 8: *I mean height (she uses her hands).*

The teacher reviews their ideas and writes them down.

Teacher: *Do you have any more thoughts?*

Child 9: *If the weather is warmer, it slides more easily.*

Teacher: *Yes, that's called a temperate glacier. This all makes sense, you've figured it out without reading from the book. But why is a temper-*

ate glacier still freezing and cold?

Child 10: *It's just so, so cold even when it's warm. Even when the sun is out in the Arctic, it's still so, so cold.*

Teacher: *Imagine that you can't have a glacier without ice and snow! We've used many interesting words today and we are building a glacier vocabulary.*

She holds up cards with words written on them that the children have used. The class reads each one together.

Teacher: *We'll put these cards in the writing area. You can refer to them when you write and you can play sorting and matching games with them.*

Teacher: *What are your ideas about how much a glacier moves?*

Child 11: *Some move very little, maybe 12 cm a year.*

Teacher: *Show us with your hands how much that is. Everyone show me with your hands how much 12 cm is.*

Some children begin to talk with each other in loud voices.

Teacher: *I know this is very exciting to talk about but we need to be respectful of each other. Look at the class rules (she points to the list). Remember that one of our rules is to listen to each other and not to interrupt. Who has other information about how glaciers move?*

Child 12: *Some glaciers move 100 meters a day.*

Teacher: *If you were standing on it, do you think you could feel it moving?*

Child 13: *Maybe.*

Child 14: *Yes, but you'd have to be still for a long time.*

Teacher: *Yes, I think so too.*

She reads a few paragraphs from a book about glacier and points out many photos of glaciers.

Teacher: *We just read that a glacier carries rocks with it and grinds them up. This is called rock flour. What an interesting name!*

Child 15: *Yes, it's like little tiny pieces that turn the water a brownish color.*

The teacher decides it is time to bring the discussion to a close:

Teacher: *As part of our study of glaciers, our class is going to create a mural to put in the hallway to teach the rest of the school about glaciers. Don't answer right away, but take two minutes to think about what we can do. Close your eyes and imagine what the mural could look like.* (Two minutes of silence pass.) *What are some of your ideas?*

Child 16: *We could make a drawing of a glacier.*

Teacher: *Do we need to do anything before that?*

Child 17: *Yes, we need mountains to show where the glacier is.*

Teacher: *Yes, we'll need to show the environment where the glacier is located. What would the mountains look like?*

Child 18: *Some are covered with snow but some could be green because the snow has already melted.*

Teacher: *Interesting idea. I'm not sure everyone heard it. Could you say it again, louder. What else would be near?*

Child 19: *Water.*

Teacher: *Why?*

Child 20: *Because it's the meltwater from the glacier. We could draw a thin line of meltwater.*

Child 21:	*We could use rocks and rock flour.*
Teacher:	*Where would we put rocks? On the floor?*
Child 21:	*We could make imaginary rocks out of paper and paint them.*
Child 22:	*We could put a glacier on a string and move it every day to show that a glacier moves.*
Child 23:	*We could write out questions about glaciers that people could look at to learn about glaciers.*
Teacher:	*Give me an example of what you mean.*
Child 23:	*We could write a question on a card and put the answer on the other side. For example, "How fast does the fastest glacier move every day?"*
Teacher:	*Everybody has many interesting ideas. When you are at the art or writing center today, draw or write down your ideas about our mural. Also, think about what kind of materials we will need for this project. Now it is time for everyone to get into reading groups.*

The teacher has many roles during this discussion. She:

- Asks closed and open questions.
- Demonstrates concepts by using the ice cube.
- Brings in resources by reading part of a book.
- Helps the children use the class rules and creates a classroom community.
- Builds vocabulary by making the vocabulary cards.
- Values ideas by writing them down on the large pad for everyone to see.
- Leads the class into the next project: making the mural of the glacier.

- Solicits ideas and knows that as the children make plans for the mural they will be learning even more about glaciers.

This class discussion, only one half-hour in length, is an example of a how discussing a curriculum topic helps children reflect on their learning and also gives the teacher an opportunity to find out what children understand (and do not yet understand) about the topic.

Learning Centers and Curriculum Projects

In the Step by Step Program, teachers facilitate children's thinking about their learning by setting up learning centers and guiding curriculum projects. A class has just visited the bakery as part of their study of community. The teacher asks the children to work in pairs and to select a learning center where they can reflect on what they learned about the bakery. The teacher has different tasks set up in the learning centers: at the writing center, they can write a play about baking bread or write some recipes for bread; in the art center, make a collage of the bakery; in the block area, build a bakery; in the science center, read about yeast and try some experiments with yeast. In the math area, children can draw a picture and write about each step in making bread. They then have to put the drawings in order of what happens first, second, etc. The teacher knows that this is a math sequencing activity. Each day, children are asked to record how many slices of bread they eat; at the end of one week, they will add them up. During a morning meeting, children discuss their favorite kinds of bread; later in the day, the class makes a graph of their favorites.

In the learning centers, the teacher provides many different ways for the children to clarify their concepts through their own activity and to deepen their understanding. They will be working on important social studies concepts about workers, different kinds of jobs, purchasing supplies, and paying for goods. The study of the bakery will go on for several weeks and the activities in the learning centers will change as the children's ideas and questions change.

Curriculum projects are the essence of children's in-depth learning. They take time and allow children to think and raise questions. Curriculum projects or themes are not short-lived; rather when they reflect children's interests, they can go on for weeks, even months. In the course of curriculum projects or thematic studies, children have an opportunity to clarify, organize, analyze, and synthesize their ideas and to learn about themselves as individual learners. If children's work in a classroom only consists of work sheets and teacher-dominated activities, they may learn some skills but not be able to apply them in interesting and challenging ways.

Providing Resources

In order to enrich the curriculum and further stimulate children's learning, the teacher must search out and provide resources for the class to study. These resources might include books, posters, newspapers, hands-on-objects, and materials for art, science, math, and writing centers. Other resources include speakers and trips. In a child-centered classroom, textbooks and readers are just a springboard. The teacher's role is to take the initiative to be creative, to reach out to the community in order to gather resources for the classroom.

There are many ways teachers can get resources: from the local library or in school, from the natural environment (leaves, sticks, shells, etc.), from the home environment (cloth scraps, yarn, newspapers), from contributions from local businesses or organizations. Family members, retired workers, and other community helpers are important resources. They can enrich the school curriculum through story telling, discussing their work, sharing what life was like when they were children, cooking with the children, making crafts or making books. Volunteers, such as parents and grandparents, can also be a resource to the teacher by offering individual attention when children need help with their work.

Some resources are easily available to teachers, especially materials from nature:

> Mrs. K. collects leaves and twigs on her way to school to help children observe the seasonal changes taking place. She asks the children to bring in other items from nature that reflect the season. In this way, the children expand the science center and it reflects what interests them.

Teachers encourage children to bring in items from their homes:

> In another classroom, children are talking about taking care of the environment and how important it is to recycle. They bring in string, small boxes, and used bottles. Using these objects, they begin to reconstruct the bakery they visited for their study of the community.
>
> Buttons provided by one mother who is a seamstress go into the math center where they are used for counting, sorting, and classifying. Walnut shells and sea shells are also used for math activities.

Parents are another resource for classrooms. By being aware of what kinds of work family members do, teachers can deepen children's understanding of the curriculum by inviting guest speakers to class. Children develop research skills be designing and writing interview questions and recording their answers.

> In a class that is studying their country's geography, Mrs. L. remembers that Victor's father drives an truck and travels throughout the District. She invites him to speak to the class. Using a map of the District that the teacher has provided, he answers questions children have prepared about different places he goes and about the routes he takes. The discussion deepens as children ask him how he learned to drive and repair his truck. Although the children had not planned to ask about the truck, their obvious interest in Victor's father work opened up a new area of study.

In another classroom, a mother who is a dentist discussed dental hygiene, showed the children how to brush their teeth and provided them with toothbrushes. She also helped the children examine their saliva under a microscope she had brought to the classroom. A father who is a carpenter likes to help the children in the math center and plans to build shelves in the classroom with a small group.

Teachers also bring in resources to expand and stimulate children's ongoing work.

> After a visit to the post office, the teacher, Mrs. P., works with the children to create their own post office in class. Using recycled cans that Mrs. P. has saved from home, each child makes his own post office box. At writing time, children can choose to write a letter to a classmate or the teacher. Having a post office in class, which originated with the resources the teacher provided, stimulated prolific writing by the children.

For the child-centered teacher, the entire community is a resource. By understanding the developmental stage of the students and by planning for the curriculum centers and projects, the teacher is able to bring in the available resources to enrich and engage the children.

The Teacher as Observer and Assessor of Children's Learning

In the Step by Step Primary Program, teachers rely on *authentic assessment*. It is a form of evaluation that occurs continually as children learn. It requires that teachers observe and record children's behavior as they work alone and in the group, as they learn about all subjects, and as they make mistakes and try again. It also requires that teachers provide ongoing feedback to children about their learning; they talk with children and write comments on children's work. Their feedback is specific, positive, and helpful.

For many teachers, this role may be new and different. In teacher dominated classrooms, teachers often rely on tests and homework assignments to indicate if children are learning; teachers may have motivated children by praising only the "best" students or by criticizing those not doing well. Teachers may have only written a numerical score on children's work. However, in a child-centered classroom, there is much more to the process of assessment and the teacher's role is greatly expanded. Teachers can learn to be observers of children and to provide ongoing assessment of their learning.

The Beginning of the Year

When do teachers begin assessment? On the first day of school! The assessment teachers do at the beginning of the school year helps them make decisions about room arrangement, the schedule, and the curriculum. Some of the questions, teachers will want to answer are (Dodge, Jablon & Bickart, 1994):

- What skills and knowledge do the children already have?
- What are they ready to learn?
- What learning styles do they have?
- What are their interests?

Even if the teacher has taught the same children before, she still has to take a fresh look at them at the start of the new school year. They will have grown and had new experiences since the last school year. Maybe some will have taken exciting trips, learned how to swim or play a musical instrument, or had family changes like an illness or a new baby. All of these events in children's lives can make a difference in how they feel about themselves and school. So an important question all teachers must ask is: *What are the special strengths and needs of each child in the class?*

Information can be gathered from conversations with children's families, from former teachers, and from the children themselves. And most important, the teacher learns about the children by observing and listening as they work in the classroom. It is only when teachers know children as individuals, with their strengths and needs, that they can individualize instruction. Individualized instruction is the core of a child-centered classroom.

In the first month of school, a teacher notices that students use different approaches to solving math problems:

> Gregor likes to try figuring out the answer with a partner; Olga likes to use the unifix cubes; Lucia likes to draw pictures of the math problems. Since each child prefers a different method and the teacher knows that no one way is always best, she makes sure that the unifix cubes and the drawing paper are available during math time. She also plans times when children work together on math problems. In these ways, she builds on each child's strengths. She also knows that for eight, nine and ten-year-olds, one of the curriculum goals is to help children solve math problems in their heads. She plans how to help Olga and Lucia move from a reliance on concrete materials to more abstract problem-solving.

Ongoing Assessment: Observing and Recording

Teachers continually monitor children's development and learning. Every day they watch as children use materials and interact with others. Some observations are informal, while others are more focused to determine if a child has acquired specific skills, knowledge, or competencies. Both kinds of observations provide valuable information. When teachers write down or record what they see, they have a record to refer to. When observations are made at different times of the day, over time, and in different situations, then teachers can detect patterns in behavior. Just one observation of a child's behavior at one point in time does not provide a complete or valid picture of the child's learning.

> A teacher of eight and nine-year-olds made these short observations of Christopher when the class was learning about geometric shapes:
>
> 10/5/95 – C. makes triangles of different sizes on the geoboards.

> 10/8/95 – C. makes rectangles on the geoboards. Then he divides them into triangles.
>
> 10/17/95 – C. tells me that there are many different shapes in the classroom: the windows are rectangles, the table tops are squares, the clock is a circle.
>
> When she reads over these observations, the teacher notices that C. prefers the geoboard to other math materials and that he understands the concepts because he can apply them as he looks around the room.

The kind of language teachers use in making observations is very important. Christopher's teacher only wrote down what she saw and heard. She only recorded the student's actions and did not make any judgments. She did not say "he was smart" or "he learned the math lesson." She made objective and neutral observations. If a teacher has questions, concerns, or interpretations after she makes an observation, they can be written down separately. For example, as Christopher's teacher observed him in other activities, she thought about how she could extend his learning. First, she wrote down what she saw and then she added a comment. She used parentheses ( ) to indicate that it was a comment and separate from the observation.

> 11/2/95 – C. worked with the tangram pieces and fit together two triangles to make a square, four rectangles to make a bigger rectangle, etc. He did this for one hour. (I think he is learning about fractions. I'm going to show him how to write simple fractions.)
>
> She also observed Aurelia having difficulty in reading:
>
> 11/13/95 – When A. read a page out loud, she sounded out three new words and got them right. But she did not stop at the end of the sentences. (She has learned a reading strategy for new words. Does she know what a period is? Does she use periods in her own writing? I need to observe as she writes.)

When teachers are observers of children, they become experts on their classrooms. They are able to make decisions and to facilitate the children's learning. They learn to describe what children can do and they do not focus on what children cannot do.

Ongoing Assessment: Reviewing Children's Work

It is important for teachers in child-centered classrooms to give children frequent feedback about their work. This helps motivate them by showing that the teacher is interested and is there to guide them. It also helps children problem solve, deepen their understanding, and take risks.

Often teachers give feedback as they talk with students. In a child-centered classroom, the teacher has many opportunities to talk with individual children, small work groups, and the whole group. As she moves around the room, she can talk with children in learning centers or at tables. What she says will depend on the nature of the work and the individual children involved. Sometimes she will make comments and other times, ask questions. Her role is active and she takes the initiative. Her feedback is positive, specific, and meaningful; it is not empty praise like saying "this is the most wonderful story I've ever read." Children will suspect that is not true!

Teachers should avoid using words that imply judgments such as "good," "poor," or "nice." It is more helpful and satisfying to children for the teacher to specify what is good, poor, or nice about their work.

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Instead of:	**Use:**
"Good work"	"You worked hard on the math problem and figured out two different ways to find the answer."
"Poor"	"I noticed you rushed to finish. You misspelled words you know and did not use punctuation. You have to correct your mistakes."
"Nice work."	"What an interesting idea. You have learned a lot about spiders. What else do you want to learn about them?"

Here, a teacher provides feedback to help a child expand his ideas:

> The eight and nine-year-olds are writing stories about animals. Mikail writes and reads back to the teacher, "My dog is good." The teacher asks him, "What do you mean by good? Tell me what does your dog do that's good?" (In this case, the teacher expects Mikail to write with more detail. Good is too vague a word.)

Teachers also provide written feedback on children's work. Depending on the nature of the work, the teacher will comment in different ways. Sometimes a teacher will make a check mark next to each correct spelling word on the test or next to each correct math answer. If that is a review paper and the child has already learned the concepts and is practicing what he knows, then the teacher can respond in a brief fashion. But when children are expressing complicated ideas, learning new concepts, or mastering skills, teachers must give more specific and thorough feedback.

- During writer's workshop, Sergei sometimes writes about the television programs that he and his family watch at night. The teacher often writes a question at the bottom of the page about the program or his reaction to it. Her questions include: "Why do you like this character? Is he funny?" "Do you think the ending is fair?" "Would you like to live on a farm like the people on the T.V. show?" Each time, he writes an answer back to her.

- When Elena made a mistake on a math problem, the teacher wrote on her paper: "Study the problem again. Ask a friend to work with you. Draw a picture of how you got your answer."

- Cosmin sat in the Author's Chair and read his story about his grandmother's vegetable garden to the class. The teacher raised her hand to make a comment. Cosmin called on her and she said, "I noticed you are the kind of writer who likes to use details. You really described the color and taste of the vegetables." After Maria read her story about her grandmother, the teacher told her, "I noticed you are the kind of writer who likes to use dialogue..." (In these ways, the teacher was drawing attention to different writing styles and encouraging children to try them out.)

Teachers can also write comments to provide reassurance or to express empathy with the child:

> One day, a nine-year-old writes in his journal: "I'm sorry, but I don't know what to write about." The teacher writes back: "Sometimes that happens. I can help you if you want." (Here she gives him the choice of asking for her help. In this way, she encourages him to be self-reflective and take responsibility for his learning.)

Children have ideas about what kinds of feedback they want. In a classroom, where children's ideas are valued and children's voices listened to, the teacher asked her class, "When I talk to you about your work or write on your papers, what do you find helpful? What do you want to know about your work?" The children had many ideas:

- "When I wrote a story about a unicorn and a lizard, you said, 'You know a lot about unicorns. But explain how the unicorn makes friends with the lizard. Tell more about the little lizard.' You told me what I needed to do to make my story better."

- "When I work hard on a math problem, but get it wrong, I like you to say, 'I know you'll get it. Keep trying.'"

- "Teachers should not tell children their work is bad because then children feel sad. You do not want to learn when you feel sad."

As these children suggest, teachers need to offer meaningful, specific, and supportive feedback. Then students will be motivated to work hard and they will develop positive attitudes about learning. They will also develop a deeper understanding of the curriculum concepts and become more proficient at expressing their ideas.

The Teacher as Role Model

The teacher sets the tone of the class. Through her questions, comments, classroom organization and management style, as well as her curriculum choices, the teacher is a role model. How often teachers hear their own voices and words echoed by a student, often to their dismay!

> "Hurry up! I can't start until everyone is seated," scolds one student as she waits to share her story.

But teachers are sometimes rewarded and gratified when they see themselves reflected in children's behavior.

> Ms. J. praised children's efforts in class. She would often say, "You worked hard. You're learning. Don't give up." Then she began to hear the children making similar comments to one another as they worked on group projects!

The teacher establishes a climate where everyone is treated with respect. From the beginning, by including children in setting up class rules, the teacher lets the students understand that the classroom is a community where everyone takes responsibility. When the teacher is fair and accepting, each child feels accepted and appreciated and will treat others the same way.

> Two ten-year-olds are working on a math problem together. One says, "You're stupid. You added wrong." Another child at the table intervenes and says, "Don't call him stupid. He just made a mistake." The child apologizes to his classmate.

The teacher who sees children's strengths and celebrates them, models an acceptance of differences that children will follow.

> Although Britta has a difficult time writing and reading, she is an exceptionally talented embroiderer. Her teacher, noticing the embarrassment Britta feels when called on to read, decides to read with her one on one. But she also knows about Britta's talent and encourages her to teach other children stitchery during choice

time in the art center. Britta's self esteem grows as the children learn to sew with her.

The teacher also models problem-solving techniques. The children are learning how to write letters to people. Cyril writes a letter to his grandmother who lives in another country. During a class discussion about letter-writing, Cyril asks, "How does the post office know how to find my grandmother?" The teacher opens his question up to the rest of the class: "Who has an idea about this?" As the children start to respond, she writes their answers on the board. The class is so interested and excited, that she decides to divide them into small groups so they can research Cyril's question. She has modeled asking questions, generating possible answers, and working collaboratively. She has modeled the scientific method for her class, an approach they will need to use as they study and work in a democracy.

Summary

These roles of the teacher are inter-related. No role stands alone. As you make curriculum decisions, you are observing your students to assess what they know and are interested in. As you facilitate their learning, you are a role model of appropriate behavior and attitudes. Teachers in a child-centered class have many complementary roles. Teachers do not assume these roles overnight, rather it is a process. With time and experience in a child-centered classroom, you become more comfortable in these roles. You will enjoy teaching more because you will be able to express your own individuality and know that you are making good decisions. Most of all, you will see the results in the children; they will be learning and developing to their full potential.

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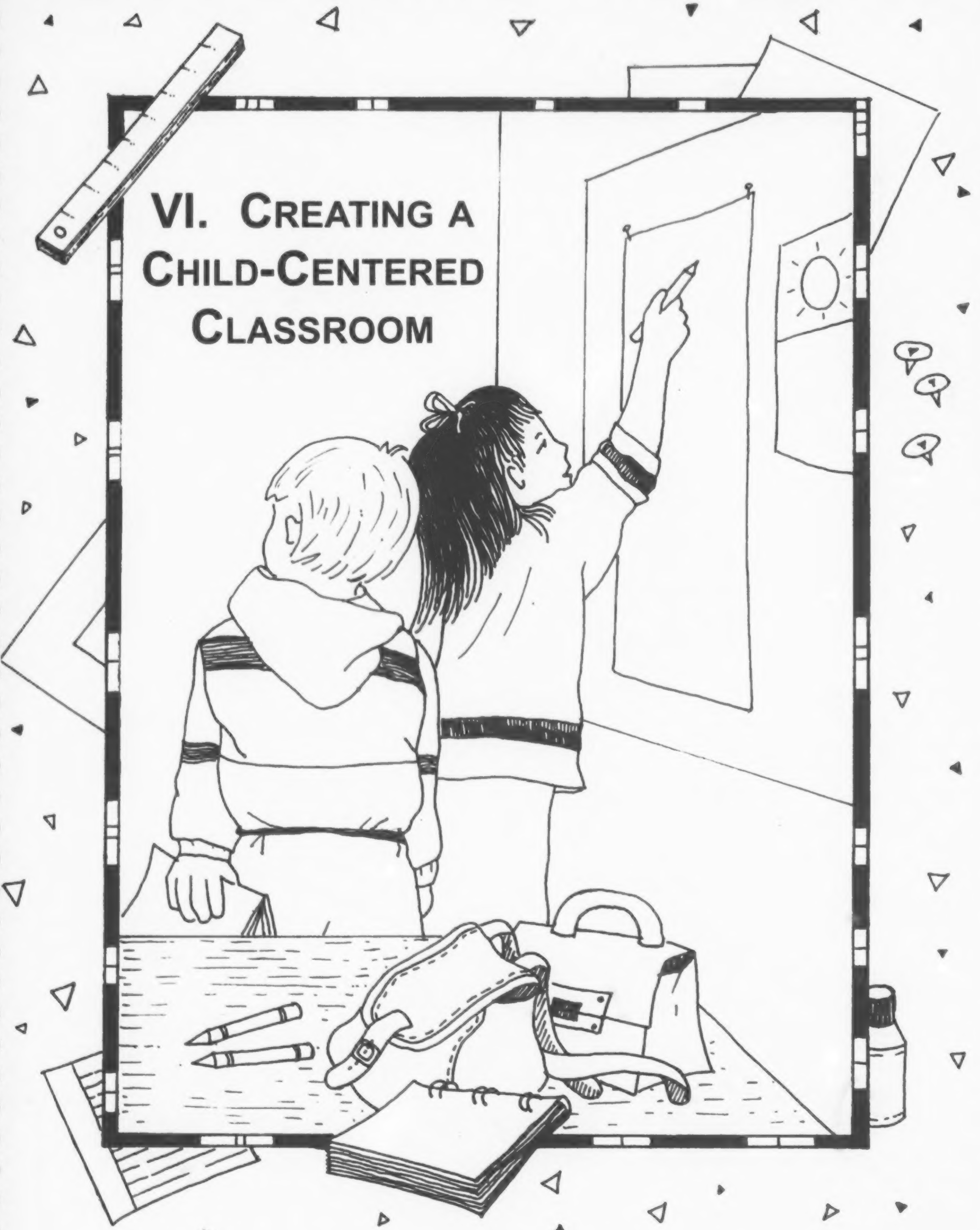
VI. CREATING A CHILD-CENTERED CLASSROOM



VI. CREATING CHILD-CENTERED CLASSROOMS

The real voyage of discovery consists not in seeking
new landscapes but in having new eyes
Marcel Proust

Overview

Recognizing and respecting interests, individual competencies, personal learning styles, and cultural values of all children are paramount to the philosophy of the Step by Step program. Teaching the child how to learn, rather than what to learn, and enabling each child to develop his own potential are equally important. Competitive industries in the 21st century will be those whose workers can solve complex problems and design more efficient techniques to accomplish work. To be sure, basic knowledge is important for students to understand. But deep, conceptual understanding—knowledge that lasts longer than the time it takes for a student to pass a test—is also needed.

The purpose of this section is to identify principles of effective practice and classroom organization. Such principles maximize student learning and promote engagement.

Knowledge, understanding, and acceptance of how individual students learn is necessary for the teacher in planning a meaningful learning environment. Providing options in classroom management and operation, as well as in curriculum planning, is a successful teaching strategy to facilitate individualized learning.

Options are defined as alternatives or choices within the classroom. Options provide a range of choices to meet individual children's interests and styles of learning. They reflect the teacher's provision of alternative ways in which the same skill can be developed. There are many opportunities to provide for choice:

- Vary the approach to activities.
- Vary the type of materials used.
- Vary the setting and interactions.

Students differ in their approach to learning, thus one of the most difficult challenges is meeting the needs of each individual child in a given classroom. Educators must develop an awareness and understanding of various learning styles and adapt the learning environment to accommodate each child.

Multiple Intelligences

Children need the opportunity to develop their intelligences and talents. The best place to provide these opportunities is in the natural learning environment. The classroom, therefore, must resemble such an environment. The concept of intelligence must lose its mystique and become a functional concept that can be seen working in people's lives in a variety of ways. In 1984, a Harvard University Professor, Howard Gardner, challenged the concept of intelligence saying that culture had defined intelligence too narrowly. He proposed in his book, *Frames of Mind*, the existence of at least seven basic intelligences. They are:

Linguistic Intelligence. The capacity to use words effectively, whether orally or in writing. This intelligence includes the sounds of language, the meanings of language, and practical use of language.

Logical-Mathematical Intelligence. The capacity to use numbers effectively and to reason well. This intelligence includes sensitivity to logical patterns and relationships, statements and propositions, functions, and other related abstractions.

Spatial Intelligence. The ability to perceive the visual-spacial world accurately and to perform transformations upon those perceptions. This intelligence involves sensitivity to color, line, shape, form, space, and the relationships that exist between these elements.

Bodily-Kinesthetic Intelligence. Expertise in using one's whole body to express ideas and feelings and the ability to use one's hands to produce or transform things. This intelligence includes specific physical skills such as coordination, balance, dexterity, strength, flexibility, and speed.

Musical Intelligence. The capacity to perceive, discriminate, transform, and express musical forms. This intelligence includes sensitivity to rhythm, pitch or melody, and the tone color of a musical piece.

Interpersonal Intelligence. The ability to perceive and make distinctions in the moods, intentions, motivations, and feelings of other people. This can include sensitivity to facial expressions, voice, and gestures.

Intrapersonal Intelligence. Self-knowledge and the ability to act adaptively on the basis of that knowledge. This intelligence includes having an accurate picture of oneself, awareness of inner moods, intentions, motivation, temperaments, and desires; and the capacity for self-discipline, self-understanding, and self-esteem.

The theory of multiple intelligences, as presented by Gardner, opens the door to a wide variety of teaching strategies to be implemented in the classroom. The theory offers teachers the opportunity to develop innovative teaching strategies that recognize and develop various kinds of intelligence. Multiple intelligence theory suggests that no one set of teaching strategies will work best for all students at all times. It is in this light that classroom organization and management is discussed.

Materials and Organization

A planned, active, and involved child-centered methodology can ensure individual opportunities for children to grow in a variety of ways. An effective way to individualize the curriculum is by using learning centers that reflect the current interests and academic needs of the children.

Learning centers are developed from a set of criteria, but they can take many forms. Developed to promote small group learning through exploration, independence, and active involvement, centers can be used by an individual, a pair of children, or a small group. Each center should include multi-level (concrete, pictorial, abstract) activities and materials that will accommodate individual needs and styles. Centers provide opportunities for developing new skills to relate past experiences and to broaden understanding.

Planned centers meet individual needs in the classroom and provide children freedom to move physically and academically in their learning (Dehls, 1977). Classroom groupings should be heterogeneous in order to provide opportunities for children to learn from peer models.

In the child-centered program, there are certain essential materials that each classroom will need. In addition, there are optional materials that can be gradually introduced throughout the course of the year.

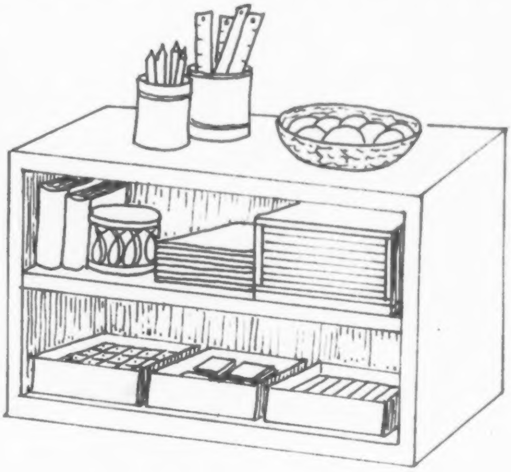
Learning Centers

The organization of essential materials into centers is both logical and research based. Since children learn by associating new information with known information and novel materials with familiar materials, it is logical to group similar materials together in learning centers. Following this line of logic, it makes sense to cluster these groups in a way that is both functional and appealing to students.

Essential centers for the classroom of older primary students would include: a literacy center, writing, science, math/manipulatives, art, and drama/creative play. These centers should be arranged in a logical fashion (for example, noisy centers near each other) and should include all necessary materials.

Additionally, consideration should be given to the use of temporary and highly mobile activity centers. Those that are easily put up and taken down as they relate to the themes of the curriculum.

Developing Life-Long Learners



The long-term goal of the Step by Step Program is the development of life-long learners. As educators, it is our responsibility to guide children in the development of these five characteristics that have been identified as those that will lead toward children becoming life-long learners.

I. Creativity

willingness to take risks
spontaneity
interest in exploration
ability to analyze
frequency
originality
sense of humor
flexibility

II. Productivity

organization
follow-through
perseverance
initiative
evaluative ability
focus
motivation
analytical ability

III. Curiosity

- interest in exploration
- inquiring nature
- ability to analyze
- experimentation
- higher-level thinking
- evaluative ability

IV. Cooperation

- thoughtfulness
- sense of connection to others
- positive attitude
- responsibility

V. Empathy

- tolerance
- sharing
- acceptance of others
- understanding
- patience
- thoughtfulness

Managing Materials

Children need to be taught how to manage the materials in the classroom. When planning a child- or learner-centered environment, teachers need to demonstrate for the children how the materials are to be used. They should assume that children may not be familiar with the materials found in the classroom.

Teachers should introduce all classroom materials—pencils, crayons, paints, manipulatives, scientific equipment, books—gradually and methodically. As materials are introduced and the use of each is demonstrated by the teacher and two or three students, the group can discuss where and how the object(s) should be stored.

For example, if students have just completed a discussion on the use of glue, they might benefit from further discussion on where to store the glue. Perhaps many children and the teacher may think that glue is best utilized, and therefore stored, in an art center. However, there may be a few children who will disagree and assert that glue belongs in a writing center. Both groups are correct. The class can now decide if it would like the glue to be stored in the art center, the writing center, or both. By creating and participating in this discussion, the members of the class (including the teacher) have been involved in a meaningful conversation in which they felt free to express their opinions.

To ensure further success of handling classroom materials on a daily basis, items should be clearly labeled with a picture (a drawing or a photograph) and the name of the item(s). Teachers should put labels both on a shelf and on the box in which the item is stored.

Children who are actively involved in the organization and choice of materials and who receive careful instructions about using them appropriately are prepared to use them independently and responsibly.

Children Managing Their Own Behaviors

The child-centered classroom is different from the traditional classroom in many ways. One crucial difference is in the way students' behavior is managed. In the traditional classroom, the teacher makes the rules and the students follow them. If students break the rules, they are punished. In the traditional model, children are neither encouraged to develop self-control nor allowed to make choices in the classrooms. In the child-centered classroom, students develop self-control and make choices; moreover, they help generate classroom rules and procedures, and make decisions about how they will use their time during the day.

Making Rules and Procedures

Children derive a true sense of responsibility and ownership from participating in the process of rule making. To involve the children:

- Gather children in a circle in the class meeting area.
- Begin a discussion about the purpose of rules and procedures. It is important that children understand that rules and procedures—like laws—are designed to keep people safe, to protect individual rights and freedom, and to provide guidelines for appropriate behavior. Children need to know that rules tell members of a community what they should do rather than what they should not do.
- Offer some examples of positive, concise rules such as: Put things back where they belong; Listen attentively; Show respect for all.
- Elicit ideas from the children.
- Allow the class to decide which rules and procedures they will adapt.
- Remind the students that they should choose a few concrete rules rather then many very detailed ones.
- Print the selected rules on a chart and post them in the class meeting area for easy reference.

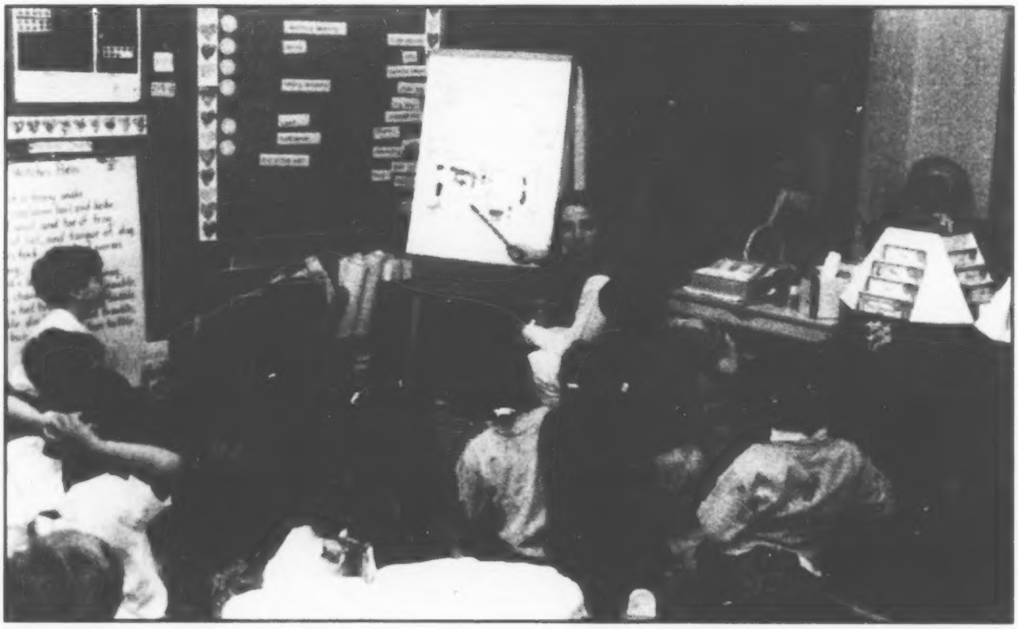
After the rules for the class are created and posted, the teacher notices when children follow the rules and makes specific comments to encourage other children to model appropriate behavior. For example, if the class has adopted the rule, "Listen attentively," and the teacher can see that a particular child is really listening to another student, the teacher should comment on the behavior, "I notice that you were really looking at Bronco when he shared his story. Your eyes were on him and you were showing him respect. That certainly must have made him feel important." Or if the class has adopted the rule, "Return things to their place," and the teacher,observes that a child is doing an exceptional job of cleaning up, the teacher might say, "Maria, I noticed that you cleaned the paint brushes and put them away. That really shows that you respect our materials."

When children choose to break a rule, the teacher reminds them of the rule and encourages them to redirect their behavior. For example, if the class has adopted the rule, "Listen attentively," and two children decide to hold a conversation while the teacher is talking, the teacher might say, "It is my turn to talk and your turn to listen. Please respect me by listening." If the two children continue to talk, the teacher asks them to leave the group. The teacher states in a firm, but not harsh, tone, "You may return to the group when you are ready to listen attentively."

Children should be reassured that adults will help them learn to manage their own behavior. They will need support, encouragement, reminding, and redirecting to begin to do this. There must always be consistency.

Forming a Community of Learners

In the child-centered classroom, teachers have the opportunity to help children gain a sense of identity and self-worth, learn shared cultural values, and become part of a community of learners. These goals are accomplished by bringing the children together, in large and small groups, to provide opportunities to work on shared projects toward a common goal. This kind of learning experience helps children become close to their peers, learn cooperation, learn to avoid criticism of others and to respect each other as individuals.



A positive classroom climate evolves out of:

- An atmosphere of trust
- A sense of belonging and community
- Involvement in decision making
- Kindness and encouragement from peers
- The teacher's energy and morale
- The teacher's authenticity and non-judgmental attitude
- Clear expectations about learning outcomes
- Fairness and equity in participation

A positive climate is built through inclusion, sharing and caring, encouragement, participation, and high expectations for each and every child. In other words, it is created by building a sense of community.

The formation of a community of learners is greatly enhanced when the teacher moves from the position of "sage on the stage" in whole class instruction to the role of facilitator in an interactive learning environment. Once teachers change their role to that of *facilitator*, meaning *one who makes things happen smoothly*, the classroom becomes alive. The image of the classroom changes from the austere vision of children sitting in carefully aligned rows of desks to something more informal. Perhaps tables could replace desks where four of five students can face each other and work together. When much of the classroom management is transferred to students, the teacher has time to encourage initiative, give feedback, facilitate student communication, suggest resources, and help and praise students. Cooperation replaces competition and solitary desk work; the immense benefits of cooperation become real for the children.

Teachers should bring the class together in the class meeting area frequently during any given school day. Children should be encouraged to share their work, express their opinions, and share in the celebration of one another's success.

Children Taking Responsibility for Their Own Learning

Responsibility is being accountable for something within one's own power or control. One of the greatest gifts teachers can give their students is to help them develop responsibility in their personal lives, in their school work, and in the community. Teachers in child-centered classrooms have many opportunities to help children develop a sense of responsibility for their learning.

Setting Goals

Periodically throughout the school year children, parents and teachers meet to set short and long-term learning goals. These goals are defined by the curriculum as learning outcomes but at the same time address the individual child's interests, abilities, and learning styles. Such goals relate to the characteristics of life-long learners. For example:

> John will increase his reading comprehension by reading three chapter books and by giving book talks to his class. He will accomplish this within one month and thus demonstrate productivity.

This collection of goals becomes the child's Personal Growth Plan, and serves as an individual guide to learning within the curriculum. Writing and periodically monitoring such goals gives the child a sense of self-direction, aids in the process of individualization and results in self-motivation. It also directly involves the child's family in the educational process.

Children, their families, and teachers evaluate the student's progress towards completion of the written goals at the end of any given goal period. At this time, completion of old goals should be celebrated, goals not obtained should be restructured to become more readily achieved, and new goals should be added to the child's Personal Growth Plan.

The creation, monitoring, and evaluation of this Personal Growth Plan must be flexible and must at all time serve the child. Such plans should be considered a pathway towards success for the individual child. Well written and properly monitored plans become an invaluable tool in the assessment of a student's progress.

Organization Within the Classroom

Allowing children to help in the physical organization and decoration of the classroom is a powerful pathway to building responsibility and developing ownership.

Teachers encourage children to participate in decisions about where materials are kept, the physical arrangement of the room, and who will be responsible for which classroom jobs. In general, children actively participate in the decoration of their *learning home*. This gives them an investment in how the classroom looks and feels, resulting in a comfortable place to learn.

Children assist in the labeling of objects and materials within the classroom, selecting and creating pictures for the walls, and in the construction of such things as job charts, birthday calendars, visual graphs, word lists, and story graphs.

Works in Progress and Record Keeping

One important characteristic of responsible students is the ability to keep their school work and the materials in their classroom in an organized and easily accessible manner. There are many systems for this organization.

Notebooks

Children are encouraged to establish and keep a notebook containing one week's work, communications between home and school, a calendar, homework (home study) assignments, a reading log, and a signature page on which parents can indicate that they have reviewed the child's work. In many successful classrooms, such notebooks are taken home each night. The child and their family review the day's work, read together, work on a homework assignment, read important messages, and sign the signature page.

Keeping a notebook helps children organize their school life and is an excellent vehicle for the development of many of the characteristics of life-long learning. Through the use of notebooks, parents become involved in the day-to-day schooling of their child.

Reading Logs

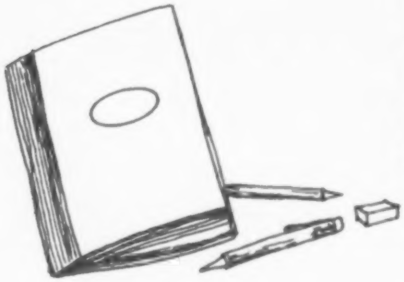
In addition to the reading section in the student notebook, each student is encouraged to keep a detailed log of what they read. Such logs are kept in individual folders and stored in a special place in the classroom. As children read a book or newspaper article, they note in their logs the title, author, subject, date and then add a few thoughts about the content of the reading. As their own reading list becomes longer, it takes on an important role in motivating children.

Writing Files

Everything a child writes should be considered an important document. The creation of writing files for each child serves the same purposes as does the reading log. As children work on a story, report, poem or any writing, they are encouraged to keep their work in this special place. Writing folders honor a child's work. They convey the idea, "This is yours, it is important and valuable." Above all, the child will always know where to find works-in-progress. This type of consistency helps to make children secure and happy in their learning environment.

Math Journals

Just as with reading logs and writing folders, math journals are individualized (one for each child). Math journals are both a record keeping device and an ongoing workbook. Children record their daily math and arithmetic work, write notations about math investigations and discoveries, and draw pictures to illustrate activities and concepts. The math journal is a powerful teaching tool. For example, as a child discovers that the perimeter



of a rectangle is the length of its four sides totaled, understanding and comprehension are increased if the child is encouraged to "picture" the concept. In the math journal, the child would write words that explain perimeter and then draw a picture that shows perimeter. In this process, learning has been elevated from knowledge to application.

Math journals are kept throughout the school year also serving as an assessment tool for the child, his teacher, and his family.

Spelling/Word Systems

In the child-centered classroom, the process of vocabulary development and learning to spell becomes a special process. Rather than have a teacher present a list of words to learn, children discover their own words in their reading, in what they hear and in their environment. As children discover words that they want to use, they should be recorded, along with their meaning and use on cards in a file. In some classrooms, these files are group files accessible to all students. In others, they are used as individual word lists. In both circumstances, such files provide a meaningful and useful tool in the development of language skills.

Other Files and Folders

The child-centered classroom should not be limited to the files mentioned here. Consideration should be given to other files such as science folders, art files, social studies and current events files. How the files are created, where they are stored and what they look like are all important factors for students. The most important thing, however, is that all of these files, folders, and logs belong to the children and function as a system of organization and follow-through. Each can be used in the assessment and evaluation process.

Homework

Homework in the Step by Step Program is designed to promote independence and responsibility. For the older school age child, homework should be an opportunity to apply new knowledge. It should not include new ideas or concepts that have not been introduced by the teacher in school. Teachers provide clear instructions about what is expected of the children. The homework assignments should be designed to be carried out independently, with minimal adult assistance. Children from eight through ten years are eager to illustrate newly acquired ideas by making things as products. For example, if the class has learned about the early inhabitants of the country, for homework, they may be expected to construct a model of one kind of dwelling in which the early residents have lived. They would also be ready to present the model, describing significant aspects of the structure.

The Step by Step Program values practice as a means of solidifying skills. However, dull repetitious drills prove to defeat the stated purpose of promoting enthusiasm for learning. It is the teachers' job to find a way of incorporating the children's interest in a practice exercise for homework. Ask the children directly what they suggest is an enjoyable way to practice a particular skill. This is a simple way of including them in determining their homework assignment and by doing so increasing their level of investment in the work.

Demonstrations of Learning

One of the most positive ways to show mastery of a concept or skill is through a *demonstration of learning*. These demonstrations can take many forms and are the natural extension of the interactive learning process. As children finish a book, conclude a unit of study, complete a painting, or reach a learning goal, they are encouraged to share their learning and celebrate their accomplishments. Such sharing and celebrations take many forms. Some are formal and some just spontaneous sharing. They might include:

- Book talks
- Independent study report
- A science demonstration
- An art conference
- Children reading stories they have written
- Reading a passage from a book
- Presentations of a play
- Singing a song

- Giving an explanation to a small learning group
- A teacher-student conference
- Teaching a mini-lesson
- Story telling

This list is certainly not complete. In the child-centered classroom, multiple opportunities will arise for students to share, demonstrate, and instruct. Not all children will immediately be comfortable with demonstrating what they have learned, but in a safe and loving environment and with the facilitation of their teacher, they will learn to enjoy taking on the role of teacher as well as that of student.

Classroom Portfolios

Students need to reflect on themselves as learners. To do this adequately, they need the proper data. One way for them to reflect is to collect all their work in an individual classroom portfolio that is kept in a filing cabinet in the room in milk crates, boxes, or trays. The students keep all their work in the folders or notebooks. After the folder has been sent home for review by the parents, it is returned to the classroom for storage. The purpose of these files is to provide data for the students to reflect on their learning. The students select what they consider to be important work as they begin to prepare for a conference with the teacher.

Paper management can be chaotic. A good workable system must be found to ensure that all finished work is stored in a child's portfolio. One of the best ways to ensure success is to distribute the portfolios on Friday, asking each child to contribute to theirs at that time. The portfolios are then returned to their proper place. When it is time for student-parent conferences or portfolio review the classroom portfolio is quite full and the students have many papers from which to choose.

There are some items or events that do not fit the file folders, like pieces of art or major projects. The larger papers are kept in a cardboard box in a closet; they can also be kept in poster board taped together to create a larger type of file. For projects, performances, athletic events, speeches, and so on, a picture or audio recording can provide a record.

There are many ways to plan and execute a portfolio review. When it is time for such review (at least twice yearly), the students should be given their classroom portfolios and asked to select papers and items that demonstrate what they have learned, and the progress that they have made or that celebrate a particular skill or talent. As these selections are made, children should attach a written explanation about why each piece has been chosen. For example, *I chose this story written in November because it shows that I am using good descriptions in my writing.*

As the children make selections for their portfolio, they should find material that demonstrates mastery of their personal goals.

Sometimes children want their families and others to know about something that just can not be represented in a portfolio. As a solution, the teacher can have the child fill out a card similar to this:

> *Sometimes there is not a piece of paper to show what I have done.*
> *I wanted you to know:*
> ____
> ____
> ____

Completed portfolios are the property of the child and they can be taken home and shared with their families, but they also provide an excellent source of information for ongoing student assessment. Therefore, they should not be sent home until after the teacher has reviewed them completely.

The Teacher's Role

Teachers have many jobs to complete and roles to fill—counselor, a business manager, a resource. A unifying thread runs through the entire framework to provide an organizing structure; that thread consists of engaging students in learning important content. All the components of the framework serve this primary purpose. And in pursuit of learning, a teacher creates, with the students, a community of learners, where all students feel respected and honored.

There are four domains of the framework, each of which refers to a distinct aspect of teaching:

Planning and Preparation

- Demonstrating knowledge of content and pedagogy
- Demonstrating knowledge of students
- Selecting instructional goals
- Demonstrating knowledge of resources
- Designing coherent instruction
- Assessing student learning

The Classroom Environment

- Creating an environment of respect and rapport
- Establishing a culture for learning
- Managing classroom procedures
- Managing student behavior
- Organizing physical space

Instruction

- Communicating clearly and accurately
- Using questioning and discussion techniques
- Engaging students in learning
- Providing feedback for students

- Demonstrating flexibility and responsiveness

Professional Responsibility

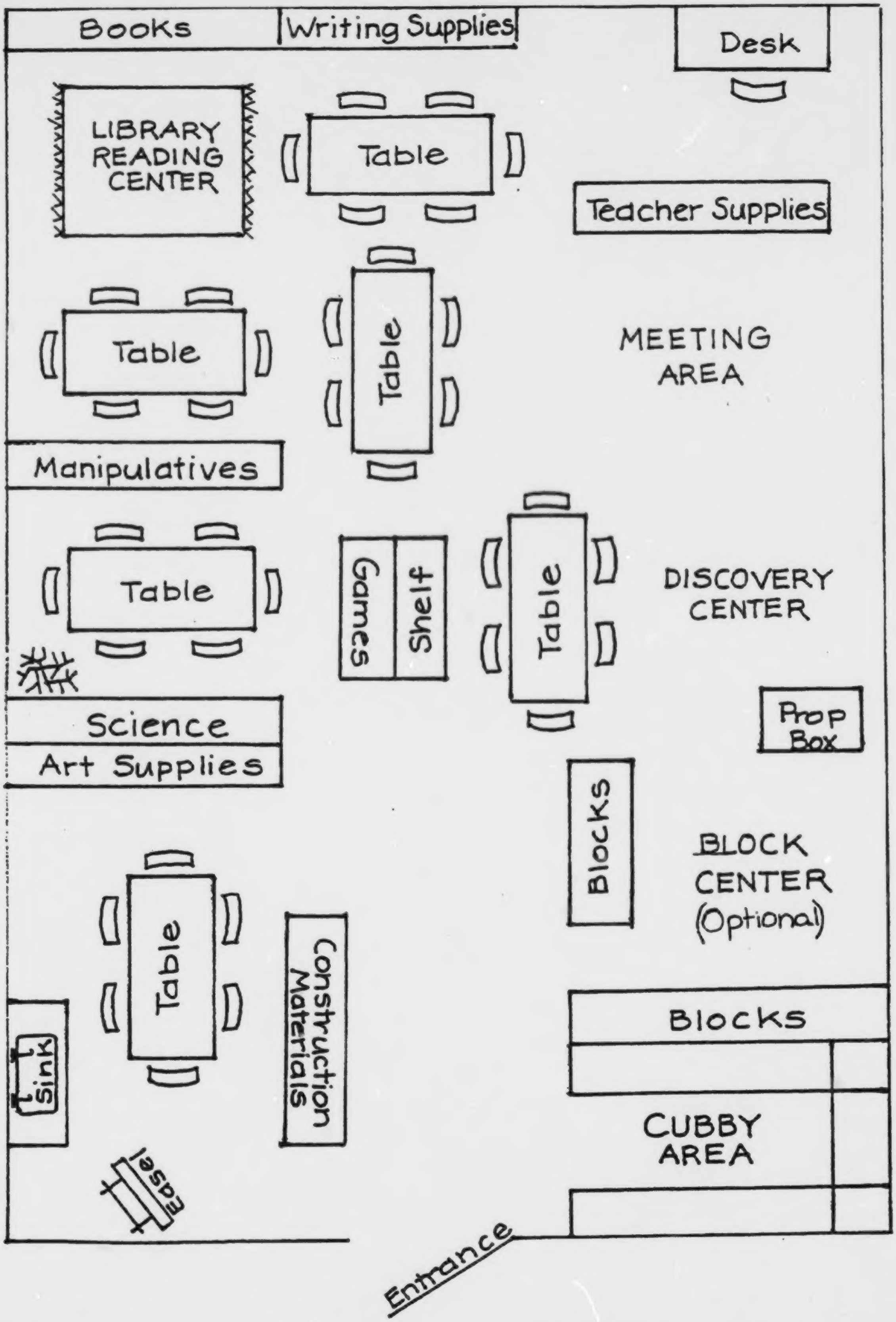
- Reflecting on teaching
- Maintaining accurate records
- Communicating with families
- Contributing to the school
- Growing and developing professionally
- Showing professionalism

(Danielson,1996)

Summary

In the child-centered classroom, it would be easy for both the teacher and the students to be overwhelmed by options that are available to them; for this reason it is crucial for teachers to provide structure when they offer choices to the children. The classroom should be logically organized (in learning/interest centers) and the materials should be gradually and methodically introduced. The teachers guide the children as they learn to effectively manage their own behavior, include them in making rules for the classroom, and teach them to use materials appropriately. They organize time so that students are allowed to talk, explore, and move about, more than they spend listening to the teacher. Quiet listening activities are followed by interactive, moving, or talking activities. Although teachers will do a considerable amount of planning, they encourage children to plan their time, too.

> *Children who are educated in this environment will become effective problem solvers and decision makers.*
>
> (Dickson)


Books
Writing Supplies
Desk
LIBRARY READING CENTER
Table
Teacher Supplies
Table
Table
MEETING AREA
Manipulatives
Table
Games
Shelf
Table
DISCOVERY CENTER
Prop Box
Science
Art Supplies
Blocks
BLOCK CENTER (Optional)
Table
Construction Materials
Sink
Blocks
CUBBY AREA
Easel
Entrance

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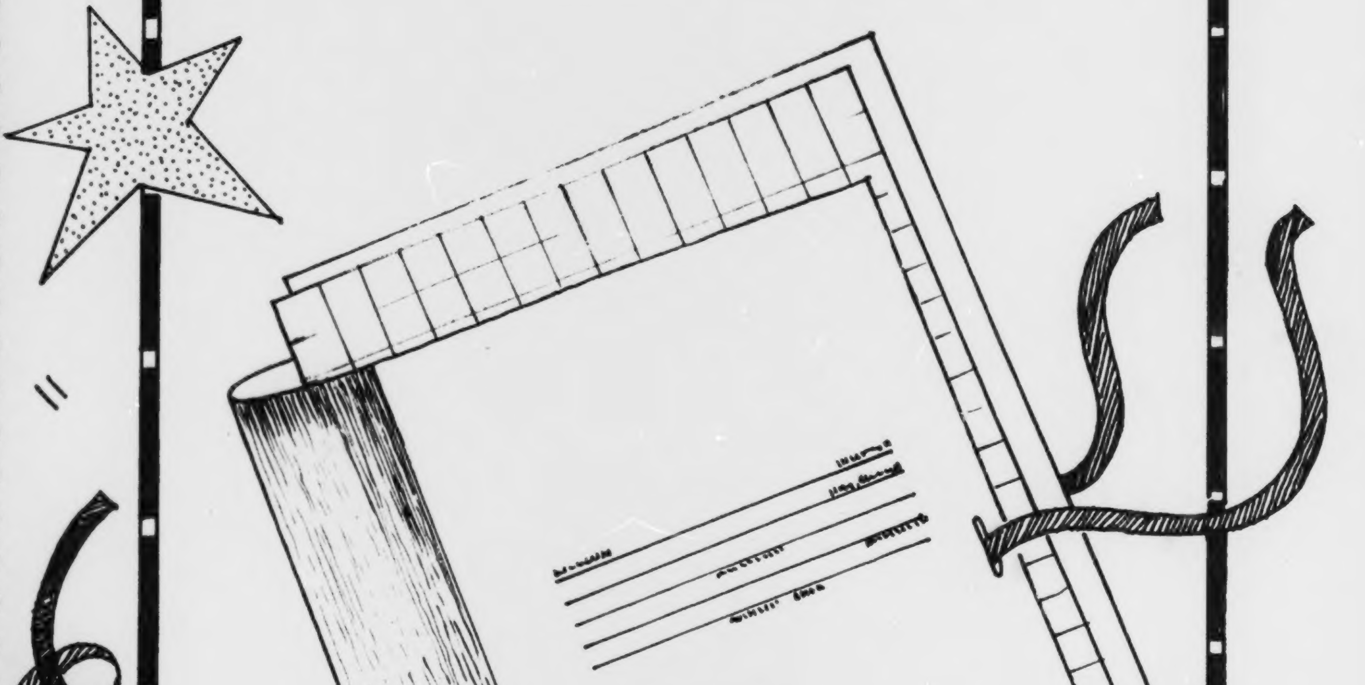
VII. ONGOING ASSESSMENT



VII. ONGOING ASSESSMENT

> *Assessment and accountability are worthy goals. The task is to create a system that usefully and fairly assesses what we care about and that does not distort the process of learning.*
>
> Theodore Sizer

Philosophy and Rationale

Learning and development are constantly in a state of change. As a result, educators must stay current in the area of assessment. A developmental primary program nurtures older school age children as they grow in knowledge, life skills, and competencies.

Ongoing assessment that occurs in the context of classroom activities can provide an accurate, fair, and representative picture of children's abilities and progress. Traditionally, assessment has focused on student accountability using frequent pencil and paper types of assessments such as graded worksheets, weekly mastery tests, and standardized tests. Teachers have tended to assess children's work to provide themselves, parents, and administrators with numerical proof of student progress. However, recent trends in education have found educators exploring and creating alternative methods of evaluating and assisting children's growth. The influence of a whole-language approach to education, where students are actively involved in the integration of listening, speaking, reading, and writing, has encouraged a new perspective for evaluating. These aspects have been incorporated to give a more accurate assessment of the child. Authentic assessment, as opposed to on demand performance assessment, is a form of evaluation that occurs continually in the context of a meaningful, developmental learning environment. It reflects actual and worthwhile learning experiences that can be documented through observation, anecdotal records, journals, logs, actual work samples, conferences, portfolios, performance tasks, and other methods. Authentic assessment is meaningful to students and is conducted in the process of learning, as evaluation is paramount to student growth.

Recent thinking about assessment stresses discovering what children know and can do, rather than focusing on what children do not know and cannot do. Teachers need to observe students complete tasks in familiar contexts where they have many different opportunities to demonstrate their knowledge and skills, rather than rely solely on paper-and-pencil type tests, if teachers wish to find out what their students truly know and can do. Assessment approaches must be geared to the developmental characteristics of children to provide more complete and thorough evidence of a child's abilities and achievements than the test scores are able to provide.

New assessment practices:	*Traditional practices*:
•Are ongoing, cumulative.	•Are annual.
•Use open-ended formats.	•Are multiple choice.
•Draw upon a variety of settings.	•Are based on a single setting.
•Are criterion referenced.	•Are norm-referenced.
•Involve student in process.	•Are teacher dominated.

(Chittendon - Edited by Perrone, 1991)

Assessment is a means of gathering information and using that knowledge to evaluate student progress and guide the instructional components of the curriculum. Criteria for assessment should include the following:

- Validity
- Many measures for achievement, not limited to standardized multiple-choice items
- Involvement of the whole child
- Repeated observations
- Continuous process over time
- Use of a variety of methods

(Adapted from Center for Excellence in the
Assessment of Student Learning, CEASL, 1995)

The assessment portfolio is a collection of a student's work that demonstrates the child's efforts, progress, and achievements over a period of time. Both student and teacher should be involved in the selection process of the portfolio samples. Assessment according to the Step by Step Primary Program should incorporate the following assumptions:

- Assessment should nurture children's growth in knowledge, understanding and confidence.
- Assessment should focus on important goals and involve multiple sources of information.
- Assessment should inform and support developmentally appropriate instructional practices.
- Parents and students are essential partners in the assessment process.

(Winograd, 1994)

The ultimate purpose of evaluation is to enable students to evaluate themselves. A child of 8, 9, or 10 years of age is developmentally ready to reflect on her growth in a particular area. This reflection should be guided by a teacher who supports the thought processes with questions and encouragement. The focus of good assessment is to allow the learner to become independent and autonomous. Student reflection is an integral part of authentic assessment.

Purpose

The main purpose of assessment is to track children's progress and accurately gauge where the students are in their learning, so lessons in the curriculum can meet the needs of individuals and ensure that each child experiences success. Identifying children with special needs who may require additional support or intervention is another reason for assessing. Appropriate assessment should provide an active link between the method of instruction, what is taught, and what is learned.

Authentic assessment should:

- Capitalize on the strengths of each student, rather than finding failure.
- Inform instruction...indicating what to teach and how to teach it. Be an ongoing part of instruction.

- Be multidimensional, focusing on social and emotional growth as well as cognitive development.
- Include active, collaborative reflection between teachers and parents, and between teachers and students.
- Emphasize the importance of learning. Promote success and optimal learning for all students.
- Be clearly understood by students and their parents.

(Adapted from Planning Level Assessment
System Pilot Study, PLAS 1993)

It is important that teachers realize what knowledge their students have mastered and maintained. Observation and documentation of children's performances are a means of gaining this information. Appropriate assessment that is ongoing, in context, and uses a variety of techniques, supports instruction and enriches curriculum planning. Assessment can and should serve different purposes:

- Students become more self-reflective and in control of their own learning.
- Teachers focus their instruction more effectively.
- Teachers determine which children need more support.
- Parents understand more about their children's progress as learners.
- Administrators understand how groups of students are progressing as learners.
- Educators gauge the level of achievement of students involved in this model.

(Winograd, 1994)

Children's learning and development should be assessed by teachers early in the school year, and be ongoing, thus providing teachers with a basis for shaping their curriculum.

Through observation of their students, teachers should modify learning experiences to meet the needs of the children. Authentic assessment is based on the understanding that students and teachers are the most critical audiences and that assessment is administered with a focus on learning. Together, students and teachers engage in the evaluation process so that students can take control of their own learning and teachers can improve instruction. The enthusiasm and optimism surrounding alternative assessment is certainly justified. But change involves challenge, and the changes in the assessment process are no exception.

Audience

Teachers, students, parents, and administrators should all be involved in the assessment process. Teachers should constantly observe their students' growth and learning. Ongoing assessment allows for teachers to talk to their children about their work each day and to use this information as a basis to shape the curriculum. Teachers should share insights gained from this evaluative process with their students so that the children can see the progress they are making and realistically know how they are doing. Teachers should be encouraged to frequently invite administrators to share in the progress of the class as demonstrated by examples of students' work.

Parental involvement in assessment should extend beyond receiving a report card to viewing actual examples of a child's work over a period of time. Parents will have a much better picture of their child's progress when they see concrete evidence of the child's work. A collection of a student's work over time illustrates the quality of a child's thinking and development. Summarizing the information will provide an efficient and comprehensive way to report to parents. In the section called Portfolio Forms at the end of this chapter there are two forms for parents that involve them in the assessment process. The first is a letter which accompanies the child's portfolio when it is sent home. This letter explains the nature of the work the child has done and what the portfolio is. The second form is a response sheet for parents to provide their observations and thoughts about the child's progress as shown in the portfolio. Additionally, a written narrative about the child's progress in all areas of development should be sent to parents three or four times during the school year. This narrative report is the basis for regular parent and teacher conferences to review the child's progress.

Types of Assessment

Traditional testing alone may fail to fulfill the underlying goal of assessment, which is optimal instruction. Authentic assessment uses more than the conventional paper-and-pencil approach of assessment and includes models that allow a broader range of intellectual capacities as valid demonstrations of competence. A variety of authentic assessments can be utilized throughout the classroom. By using an array of assessment models, a teacher will be able to get a representative picture of the whole child.

Developmentally appropriate assessment practices need to provide a wealth of information about children's physical, social, emotional, and intellectual growth. Informal methods of assessment such as direct observation, anecdotal records, and portfolios of children's work are used to assess what a child actually knows and can do. To promote success of the Step by Step Primary Program, it is crucial to use these methods of assessment to ensure that the teaching and evaluating are complementary and that appropriate developmental practices are adopted.

Observation/Documentation

This form of assessment is effective in determining what and how young children learn. Teachers collect an abundance of valid and reliable information within daily classroom activities by objectively observing children and documenting these observations. This information can provide a basis for making judgments about children and the instructional experiences that would be appropriate for them. Observation is something that teachers do all the time. For assessment purposes, observations are sometimes informal and do not include documentation; at other times, observations are done with a clear focus, such as documenting if a child has acquired a specific skill or gained particular understanding. Informal and formal observation, used together, give teachers an accurate view of each child's abilities and skills. These individual observations may take as little as 5 to 15 minutes and can be incorporated in the routine of each day. There are a variety of methods for recording observations including:

- Anecdotal records
- Checklists
- Inventories
- Photographs

- Audio recordings

To assess children fairly, teachers have to observe with a specific purpose in mind. In order to be effective, observations must be systematic, objective, selective, unobtrusive, and carefully recorded. The following guidelines can assist the teacher to perform systematic observations:

- Observe exactly what the child does
- Record observations as soon as possible
- Observe children within a variety of settings and at different times of the school day
- Be realistic in scheduling observations
- Focus on one child at a time
- Avoid being obvious
- Protect confidentially
- Choose a practical recording system

(CEASL, 1995)

Anecdotal Records:

Anecdotal records constitute an objective description of an observed activity. It can be helpful to use direct quotes from the child. Teachers should review a collection of records over time to gain insight and draw conclusions about a child's progress. These guidelines will be of assistance when using anecdotal records:

- Determine what to observe
- Put the anecdote in context, recording the date, time, and setting
- Make the anecdote precise and specific

- Keep the anecdote objective
- Keep the recording process simple

(CEASL, 1995)

[See examples at the end of this chapter.]

Checklists and Inventories:

Checklists and inventories are easy and time efficient tools for recording observations of children. They specify concrete behaviors to be observed and are a common and useful way of monitoring a young student's progress. Typically, developmental checklists state skills in the order of sequence that they are learned. Checklists are developed in advance of the observation and are useful for assessing children in activities, providing information about what a child can and cannot do in each developmental area. [See examples at the end of this chapter.]

Photographs and Audio Recordings:

Photographs and audio recordings provide records of concrete evidence of young children's performances.

Assessment Portfolios

Portfolio assessment is a method of evaluating a student based upon a collection of the student's work. Its usefulness and credibility depend upon the expertise of the classroom teacher.

Portfolios serve the purposes of:

- Fostering the integration of instruction with assessment
- Providing students, teachers, parents, and other decision makers with appropriate information about a child's progress and various classroom activities
- Enabling children to participate in the assessment of their own work

- Enabling teachers to keep track of individual student's progress
- Forming the basis for evaluating the quality of a child's overall performance from a variety of sources

(Adapted from CEASL, 1993)

Portfolios are established by a process that is somewhat subjective. When helping to choose samples of students' accomplishments, the teacher may wish to reflect on the following questions:

-What is good for this particular student?
-What are the qualities evidenced in this example that demonstrate development and progress in the child's learning?
-How does this sample of work relate to other samples in the child's portfolio?

Using portfolios for reflection and evaluation provides a rich source of information about a child's growth and development. An assessment portfolio is valuable in the primary grades because it supplies a record of a child's process of learning.

Common goals of portfolios are:

- To illustrate the student's actual work
- Enhance teacher and student participation in evaluation
- Satisfy accountability concerns

Types of Portfolios:

The Collection Portfolio is a simple folder that holds student work. It is intended to be used by the student and teacher. Ideas for the Collection Portfolio include:

- Writing—samples of all drafts and final copy, including samples from all content areas (social studies, science, math), writing check lists, research reports, journal entries, learning log entries
- Reading—inventories and checklists

- Responses to reading—book reports, open-ended questions with scoring rubrics
- Tape recordings of oral reading
- Photographs of projects and activities
- Mathematics checklist and problem solving samples

The Student's Showcase or Display Portfolio is a container/folder/box of work that shows a student's progress through achievement. It may contain work done in one curriculum area or include several disciplines. This portfolio is intended for public display and may be shown to parents. Ideas for the Student's Showcase or Display Portfolio include:

- A selection of items from the Collection Portfolio showing: best work, growth over time
- Student's reflections on selections or general progress
- A self-esteem folder including: newspaper clippings, photographs

The Teacher/Student Assessment Portfolio is a collection of documentation that assesses a student's progress and supports a cumulative evaluation. It contains copies of work in the student's Display Portfolio, teacher-written tests, anecdotal records of observations, and anything else the teacher deems necessary. This portfolio is not intended for public display but is shared with the children and parents. Ideas for Teacher/Student Assessment Portfolios include:

- Copies of material from the Showcase Portfolio
- Anecdotal records
- Conference records
- Interest inventories
- Teacher-made tests: open-ended tests, unit tests

Record keeping is an important part of portfolio assessment, as it reflects what a student is doing. Records kept over time, the range of achievement, the processes that are going on, the effort that is shown, and the improvement that is demonstrated. A large portion of this record keeping is done by selecting appropriate samples for the portfolios. These samples are most meaningful when accompanied by checklists, conferencing notes, and anecdotal records which contribute to a narrative assessment. It is important to date the students' work so that progress can be documented in the sequence that it occurs.

Rubrics

Rubrics are a set of scoring guidelines that students see before beginning an activity. By viewing established criteria prior to the activity, students are aware of what is expected of them in order to receive a certain score. A rubric identifies specific qualities that the teacher expects to see evidenced by the students and corresponds to several points on a scale. A typical rubric contains a range of possible points to be assigned and provides different traits to be examined and assessed. A rubric signifies that the assessment is criterion-referenced and demonstrates a certain level of mastery. [See examples at the end of this chapter.]

Teacher/Student Conferences

Conferences are an opportunity for a teacher and a student to discuss the student's work. Conferences should be conducted in a safe and comfortable manner so the student feels encouraged to take risks and share his or her ideas. These discussions can be brief and informal or they can be structured and systematic. The teacher should use this time to review and analyze what the student has been doing and to help the child in planning and implementing the next steps. Most structured conferences follow a predictable pattern where the student has a clear idea of what is expected of them. Conferences are often centered on something specific: a book being read, a story that has been written, or a work in progress. Teacher and student conferences are an important method of authentic assessment because they provide information about:

- What the student is learning
- The student's understanding about reading, writing, mathematics, and other aspects of the curriculum

- The nature of student's interests
- The area where the student needs help
- What things the teacher is doing that the child feels is most helpful
- What things the student would like to learn next

(Winograd, 1994)

Student Self-Evaluation

Student self-evaluation is an important part of authentic assessment. It allows students to rate their own progress and take ownership and responsibility for the process, as well as the product. Journals, reading records, learning logs, checklists, inventories, and student's written reflection on their own work is useful in tracking their progress. Children's investment in their learning and the quality of their work increases when teachers involve them in setting personal goals and evaluating their own progress. Eight, nine, and ten-year-old children want to know the expectations and standards that their teachers and parents have for them, how they are being evaluated, and the progress they are making. Encouraging children to set their own goals helps them become self-directed learners. By modeling the language and process of setting and striving for personal goals, teachers foster self-directed learning. To help encourage the self-evaluation process, the following questions can be asked of each student and documented in a journal:

Which of my skills improved last year?
What can I do very well?
Which skills can I improve?
What is the one thing I really want to work on this year?
What do I hope to learn this year?

When teachers provide opportunities for children to think about what they have learned, the students become aware they have accomplished something, or they know something now that they did not know before. In the process of reflection, children may observe that they have tried something for the first time. When they review samples of their work over a period of time and see the progress they have made, they have concrete evidence of their growing competence.

Paper-and-Pencil Tests

Customarily, paper-and-pencil tests were an integral part of assessment. While current assessment practices stress the need for a variety of assessment methods, paper-and-pencil testing should not be completely discarded. However, teachers need to be aware of the limitations this type of assessment poses. Teachers are encouraged to make tests as relevant to the actual activities as they possibly can. The use of open-ended questions ensures a variety of responses and reflects what the students really know.

It is only fair that teachers use test results to measure the individual progress of a child, rather than comparing children's progress with each other. A fixed standard or criteria for measurement allows the student being evaluated to be measured against a standard of mastery, as opposed to being measured against other children.

Summary

To be able to make informed decisions about children's education, accurate assessment of students' learning is essential. Observing children as they read, write, interact with others, and engage in all the activities available in a developmentally appropriate curriculum assists teachers to gather information about each student. Anecdotal records, checklists, portfolios, teacher/student conferences, and student self-evaluations are tools and techniques to help teachers accurately assess their students and become more effective at communication. To obtain a reliable, honest, and representative picture of a child's abilities and progress, the process of assessment must be ongoing, thorough, and conducted throughout all classroom activities. The Step by Step Primary Program promotes an approach to assessment that incorporates a variety of techniques and enables teachers to accurately share students' progress with parents and others in a way that is most meaningful.

READING/WRITING OBSERVATION FORM

1. Write the name of each child in the class, one name per square.

2. Duplicate.

3. At the end of the week, or observatioin period, cut apart and attach individual squares to each child's Weekly Observation Record (see following page).

Name ***Jane*** Date ***10/26*** ***Identified Children's names on the job chart.***	Name ***Carlos*** Date ***10/26*** ***Composed message on board.***	Name Date
Name Date	Name Date	Name Date
Name Date	Name Date	Name Date
Name Date	Name Date	Name Date

Anecdotal Records

INDIVIDUAL READING RECORD

Name ______________________________

Date	Title	Comments	Instructional Strategies

Name ______________________ Date ______________

Skill Development Checklist

Key
C = Consistently
O = Occasionally
S = Seldom

	C	O	S
In own writing, the student uses:			
Correct initial consonants			
Final consonants			
Blends			
Word endings			
The student recognizes punctuation:			
Period			
Question mark			
Exclamation point			
Quotation marks			
In own writing, the student attempts to use correct:			
Punctuation			
Capitalization			
The student can correctly sequence stories and events:			
Orally			
In written work			
The student understands real versus fiction.			
The student attempts to use correct form for a letter.			
The student can read a graph:			
Real			
Symbolic			
The student can sort by:			
Size			
Color			
Other attributes			
The student uses the words, more, less, the same, when describing graph data.			

Name ____________________ Date ______________

Listening Checklist

Key
C = Consistently
O = Occasionally
S = Seldom

	C	O	S
The student makes eye-to-eye contact with the speaker.			
The student listens with interested expressions.			
The student turns body toward the speaker.			
The student listens to and follows:			
One direction			
Two directions			
Two or more directions			
The students can attend to:			
One-to-one conversations			
A story			
Class discussions			

Name ______________________ Date ______________

Oral Language Checklist

Key
C = Consistently
O = Occasionally
S = Seldom

	C	O	S
The student can use expressive language to:			
Compare and contrast			
Sequence events			
Name common objects			
Distinguish important from unimportant			
Articulate personal plans			
Relate personal experiences			
In conversation, the student can:			
Initiate conversation			
Wait to share			
Disagree without disrupting			
Ask for clarification			
Elaborate			
Respond appropriately			
Remember an idea while waiting			
Stay on topic			
The student can articulate correctly:			
Sounds			
Words			

Name ____________________ Date ______________

Reading Checklist

Key
C = Consistently
O = Occasionally
S = Seldom

	C	O	S
The student demonstrates interest in reading.			
The student takes risks.			
The student chooses to read when given a choice.			
The student displays confidence as a reader.			
The student has favorite books.			
The student can elaborate on a book.			
The student makes predictions about what will happen in the story.			
The student asks questions to clarify meaning.			
The student remembers pictures and text to support and clarify ideas.			
The student can retell a story with:			
Beginning and ending			
Main points in sequence			
Details			
The student shares insights gained by reading.			
The student can talk meaningfully about:			
Character			
Setting			
Events			
Problem			
Solution			
Tension			

Letter About Sending the Portfolio Home

There will, of course, be times when parents cannot come to school to view and discuss the portfolio. In these cases, you may wish to send the portfolio or a copy of it home to be reviewed. This letter will establish the fact that the portfolio is coming home. The parent is invited to respond on the form that follows.

Date:

Parent of ______________________________

Your child will be bringing his/her portfolio home for your review. The portfolio is a collection of your child's work.

Please go through it with your child, asking questions as you go, and responding on the form that will be included. We are eager to get your reaction to the progress your child has made.

Because the portfolio is a part of our on-going instructional program, we ask you to return it to school the same week you receive it.

Thank you for your help and cooperation.

Sincerely yours,

Response to At-Home Look at Portfolio

The form can become part of your records after the parent has reviewed the portfolio at home. It will provide a good indication of how well you have been communicating about portfolio assessment.

Parent Response Form

Date: ____

Name of Student: ____________________________________

Please answer the following questions:

Did your child review the portfolio with you? __________________

What part of the portfolio did you like best?____________________

____

Did you child's progress come as a surprise to you? Why?

____

____

Do you have questions about anything in the portfolio?

____

____

____

I have reviewed the portfolio and am returning it with this form.

____

Parent

Criteria for Scoring Rubric

1
LIMITED EFFORT

- Completes few assignments
- Needs many reminders to stay on task and is seldom motivated
- Assignments may be missing, incomplete, inaccurate and/or turned in late
- Seldom listens attentively, participates in class discussions/activities and works cooperatively in groups

2
INCONSISTENT EFFORT

- Motivated to complete most assignments, however some may not be fully developed
- Needs occasional reminders to stay on task
- Sometimes listens attentively, participates in class discussions/activities and works cooperatively in groups

3
COMPETENT EFFORT

- Usually motivated and on task
- Completes assignments in a timely fashion
- Usually listens attentively, participates in class discussion/activities and works cooperatively in groups

4
STRONG EFFORT

- Self-motivated
- Eagerly completes assignments
- Frequently seeks a challenge
- Almost always listens attentively, participates in class discussions/activities and works cooperatively in groups

5
EXCEPTIONAL EFFORT

- Is self-directed
- Seeks challenges
- Enthusiastically completes assignments
- Listens attentively
- Eagerly participates in discussions/activities
- Contributes to effective interaction of cooperative groups
- Takes responsibility to extend personal and academic growth

Student Self-Evaluation

Name ______________________________ Date ______________________________

Did I like my project?

Did I do my best work?

Did I use different ideas?

Did I need help?

Can I do more on this topic?

Will I share my work?

Student Conference Record for Writing

Date: ____

Student's Name:

What is the title of the piece you are working on now?

____

What kind of piece is it? (Story, poem, essay, report, etc.)

How far have you gotten in the writing process? (rough draft, self-editing, peer editing, polishing) ____

____

What do you plan to do next with this piece? ______________________

____

What do you like best about this piece?

____

____

Is there anything you would like to change on this piece?

____

____

Teacher Comments: ____

____

____

Student Conference Record for Reading

Date:

Student's Name:

What is the title of the book you are reading?

Who wrote it?

Have you read other books by this author?

Why did you choose this book?

Tell me something about the story so far.

What would you like to do when you finish this book? (Options: write a report, draw a poster, give an oral report to the class, write a letter to the author, etc.)

Would you like to read another book by this same author? Why?

Teacher Comments:

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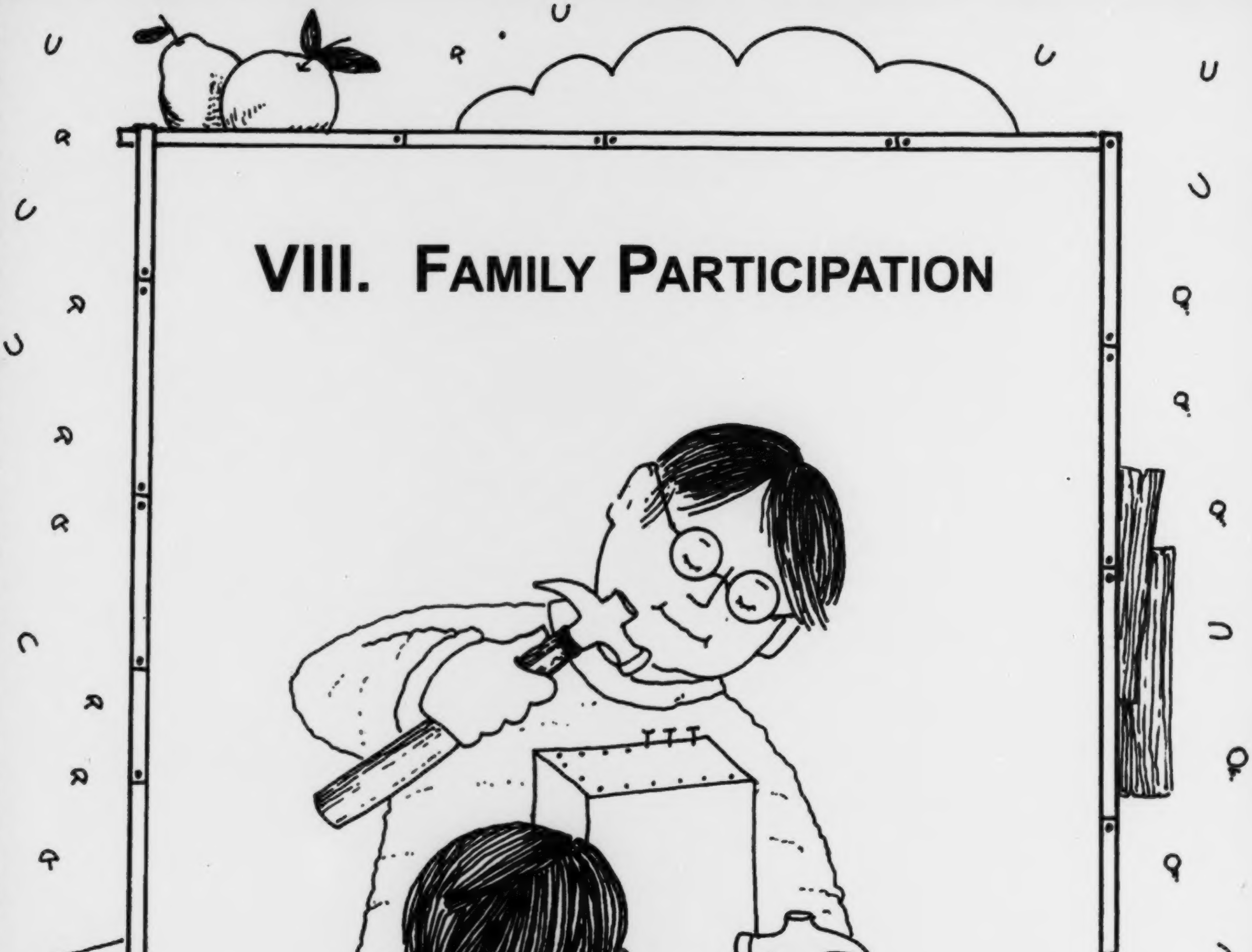
VIII. FAMILY PARTICIPATION



VIII. FAMILY PARTICIPATION

Other things may change, but we start and end with family.
Anthony Brandt

Young children enter primary school with a tremendous amount of knowledge and many skills. They have acquired speech and can communicate with others successfully. They have a wide repertoire of self-help skills such as eating, dressing, personal hygiene, and the management of simple tools. They have an awareness of manners, social customs, and strategies for interpersonal relationships. An individual's basic sense of self and approach to the world is also established in these early years. How was so much learned in only five to seven short years? The unique and powerful relationship between parent and child is at the heart of such remarkable growth. Parents are the first teachers in their child's life.

The Step by Step Primary Program recognizes, respects, and supports the importance of the parents' role as first teachers of, and experts on, their particular child. As in the Preschool Program, the Primary Program considers the parents to be partners with teachers in educating children.

What makes a family? In today's changing society the family unit is defined in new ways. We recognize that families are as diverse as the members within them. Large, extended families with relatives living together or small families with a parent and child are all valued for their primary influence on the children. Parents are the first models for problem solving, cooperation, and sharing. Parents intentionally instruct their children in becoming part of a community and a larger society. Parents hold the same broad goals for their children that teachers have for all children.

The Step by Step Primary Program believes in the collaborative responsibility of the parents and school in providing for the success of each child in all areas of growth. The teacher must communicate the desire that the school will work with parents to be a place where the child comes first. Research has shown that the effects of such a union result in the child's personal and academic growth. When children see their parents involved in school and working with the teacher, their feelings of importance are enhanced. All children benefit from a positive, friendly relationship between home and school. It allows for clear connections to be made. Children receive the message that the important adults in their world care about them. When a program treats the parents as active partners with the teacher, it motivates children to do well. Students should sense a commitment to their well-being on the part of both parents and school personnel.

How can schools and parents work together as partners? A successful parent / school connection can be achieved in two essential ways:

1. Consistent, clear, two-way communication
2. Varied avenues of involvement

Communication

The parent/school connection is based on trust. Effective communication builds mutual trust. To launch a real partnership with parents, teachers can begin by thinking about what they can learn from the parents about their children. The Step by Step Primary Program views parents as the most important consultants in helping to better understand individual children. For two-way communication between teachers and parents to be successful, teachers must use effective listening skills. Listening attentively to parents sends valuable messages towards establishing an open, mutually supportive relationship. Positive listening skills help teachers create a climate for collaboration.

Listening has been described as a four-part process. It involves hearing, interpreting, evaluating and responding. While meeting with parents, it is important for teachers to remember that listening involves all four steps. Active listening and reflection are important tools in the flow of information between parent and teachers. Active listening means literally being active in the listening process. The following illustrates the flow of communication when using active listening as a communication tool.

Parent as sender of message:	Teacher as receiver of information:
1. States message.	1. Focuses on sender's purpose and intent.
2. Hears what is conveyed.	2. Paraphrases & repeats important parts of message.
3. Determines if listener understood intent.	3. Works to fully understand sender.
4. Clarifies message.	4. Remains open to sender through out.

Through active listening, and especially through paraphrasing, the messages that are sent and received in authentic two-way communication may be more accurate, better understood, and more pleasant.

A variety of styles are available to teachers in considering communication opportunities with parents. When speaking with parents, a teacher should try to be:

> *Friendly* – The friendly communicator is encouraging to people, acknowledges others' contributions, openly expresses admiration and respect, and tends to be tactful.
>
> *Relaxed* – The relaxed communicator is calm and collected, not nervous under pressure, and does not show nervous mannerisms.
>
> *Attentive* – The attentive communicator likes to listen to the other person, shows interest in what the other is saying, and deliberately reacts in such a way that the other knows he is being heard.
>
> *Animated* – The animated communicator provides frequent and sustained eye contact, uses many facial expressions, and gestures often.
>
> *Impression Leaving* – The impression-leaving communicator tends to be remembered because of stimuli she or he projects.
>
> (from Norton's communicator style variables)

Through regular opportunities in two-way communication, parents and teachers forge a close partnership to support the children.

Parent Conferences

In the Step by Step Primary Program, parent and teacher conferences occur on a regular schedule to ensure consistent communication about the progress of each child. Additionally, ongoing, informal dialogues take place on a more frequent basis. The first meeting with parents takes place the week before school begins. The purpose of this meeting is to get acquainted. At this time, the teacher meets the child and parents, listens to what the parents would like for their child in the coming school year, and establishes a friendly, open relationship that will continue throughout the year. The teacher learns from the parents as they collaborate to set goals for the year.

The following is a list of some questions a teacher might ask to solicit information from parents:

- What would you like your child to gain from this year's school experience?
- What activities do you most like to share with your child?
- Are there special experiences or events in your child's life that you want us to be aware of?
- What are you most proud of about your child?
- Where is your child's favorite place to play?
- What are some favorite games and activities?
- What does your child do when he or she is upset? What is the best way to comfort him or her?
- What else would you like us to know about your child?
- How would you like to be involved in the class and school this year?

It is important to remember that respect and confidentiality should be maintained when discussing such topics in the presence of children. Adults must be discreet in their conversations.

Experience in schools has shown that the interactions that occur, formally or informally, between teachers and parents set the tone for future involvement of parents. As Holland states:

> *If teachers are to encourage successful parent participation, they should initiate active, personal, persistent, flexible, and positive communication efforts with parents. Teachers must believe that parents are an integral part of the educational program and expect parents to participate.*

The parent conferences that take place during the course of the school year should share the same characteristics. These are:

Preparation - Teachers should begin preparing for parent conferences as they design the classroom environment at the beginning of the school year. As the first few weeks of school proceed, the teacher keeps anecdotal records of each child, more formal individual assessments, and samples of each child's work in a file. This file creates a "picture" of the child's growth over time. In preparation for parent meetings, teachers should review any notes, records, developmental check lists, reports of earlier conferences, parent concerns, and stated goals for the child.

It is advisable to write down items of importance such as activities that the child particularly enjoys, special friends, and observations summarizing the child's experiences in all areas of development. Thoughtful preparation is characteristic of a professional approach to the parent/teacher conference. Plan conferences that are at convenient times for parents. Have paper, pens, and paper available. Be prepared to listen, encourage parents to talk.

Location – Teachers should take time to create a proper conference setting. This effort is considerate of the parents who may be worried and hesitant to attend the meeting. The principal should help make time and space available for the conferences. If the meeting is to be a productive exchange of communication then privacy is an important component. Teachers need to be sensitive to the hidden messages that barriers, such as a desk between parents and teacher, can imply (Chin, Winn, & Walters, 1978). The location should be free from disturbances. The arrangement of furniture should convey that this is a meeting of peers who are together to share information. A good room arrangement is to sit in adult-sized furniture around a low table so the child's work and any other items can be displayed and discussed. Proper lighting, ventilation, and temperature are also necessary to help focus attention on the child. (Bjorklund & Burger, 1987)

Content/structure – The conference structure should be a three-part meeting based on an outline of information to be shared in a manageable amount of time. Set a tone of friendliness by offering a refreshment. Identify strengths of the child, be prepared to share anecdotal behavior, art work, examples of class work, stories the child has written. Discuss with the parents social and emotional goals, academic and cognitive goals, and physical goals. Explain how these goals will be met; share strategies and plans. Berger (1981) recommends that in a parent/teacher conference, the teacher speak no more than 50% of the time.

Follow-up – Teacher follow-up to the conference is very important in establishing openness to continuing dialogues. If parents expect a response from the teacher, she should give it immediately. Depending on the content of the conference, a response might include referrals to other resources, scheduling another conference, a telephone call, a home visit, a written report, an informal note to the parents on a regular basis, an evaluation form asking for suggestions about conference format, and informal daily chats with parents.

Why is follow-up so important? Follow-up with parents helps to achieve many goals of the Step by Step Primary Program:

- It reaffirms the partnership between home and school
- It is a way to let parents know that the teacher and school are reliable and caring
- It helps to enhance consistent communication efforts
- It offers opportunities to extend classroom learning at home
- It helps the school serve parents by getting information for program planning

Louis Malaguzzi eloquently states in *The Hundred Languages of Children*:

> *Teachers...must discover ways to communicate and document the children's evolving experiences at school. They must prepare a steady flow of quality information targeted to parents (which) introduces parents to a quality of knowing that tangibly changes their expectations. They reexamine their assumptions about their parenting role and their views about the experience their children are living and take a new and more inquisitive approach toward the whole school experience (1993, pp. 63-64).*

The Benefits of Parent and Teacher Collaboration

When families are actively involved in primary school classes, teachers, parents, and children can all benefit. Teachers create an open atmosphere for involvement by encouraging parents to ask questions, visit classes, and to share their interests and skills.

Family participation helps teachers achieve the goal of individualizing. It is by communicating with parents that teachers are able to gather information about each child in the class. Parent involvement offers teachers the chance to be less isolated in the classroom. Teachers and parents can mutually support one another in providing interesting activities and projects for the children which would be impossible to structure with only one adult in a class. When parents feel part of their children's learning, they come to appreciate the teacher's efforts in presenting a new, exciting way of teaching and learning. Their excitement generates new ideas and positive expectations for their children. In order for teachers to genuinely be open to parents, teachers must also believe that the presence and involvement of parents is beneficial. To act on this belief, teachers must take the first step by including a parent in a classroom activity. With a parent volunteer the teacher is better able to manage many activities and children while maintaining a classroom that offers choice and a variety of instructional groupings. When parents are involved in the classroom, teachers have the opportunity to observe first hand how parents motivate their children, how they help them solve problems, how they help their children approach a task, and how the parent and child share special interests and hobbies.

When true collaboration between parents and teachers occurs, positive results ensue:

- Mutual trust is developed
- Parents and teachers worked as a team to create a unique, exciting learning experience for everyone
- Children benefit from the adults' model of cooperative teams

Volunteering: Parents Supporting Learning in School

A friendly welcoming school creates a climate for many avenues of parent involvement. The range of parent involvement is all inclusive from the traditional role of parenting, by providing for the child's basic needs and safety, to assisting with policy making and financially supporting the school. Within this range, parents act as volunteers in many aspects of school life. Some of the possible volunteer duties they may assume are:

- Special event coordinators: Parents contact resources for special programs; they help develop events which support a classroom or grade level project.

- Repair and improvement workers: Parents help with repair and improvement projects around the school, such as painting or building playground equipment.

- Library helpers: These parents assist in the library by checking and shelving books.

- Science and art helpers: Parents help with special art and science projects which require additional adult help.

- Playground supervisors: These parents volunteer their time to supervise playground activities to allow teachers free time for planning.

- Special birthday party planners: Mothers or fathers who prepare special whole class celebrations for their child's birthday.

- Room Parents: Parents from each classroom in the school assist teachers in various ways, such as making telephone calls to share important information and helping with field trips. They help make new parents feel welcome.

- Fund Raisers: These parents offer their talents and resources to raise money to help support the school financially, such as volunteering to sew in a school sewing project.

As volunteers, parents offer their time, resources, and talents to help schools develop a tradition of caring. Volunteering builds community relationships of trust and mutual good will. Every activity is important because it means that everyone has the opportunity to be involved in creating a school that is a true community.

Parents Supporting Learning at Home

Parents can help their eight, nine, or ten-year-old children become more successful learners in a variety of ways. The following is a list of ideas to help parents support their children's accademic growth.

- Let the children know that they are capable, bright people who are valued for their growing competencies.

- Talk about learning and ideas; listen to your children when they share their thoughts as you are involved in daily routines.

- Help them pursue their interests. This is an age when children like to start a hobby or collection. Talking with them about things that you were interested in when you were their age is very encouraging for them.

- Read aloud with your children each day or as often as possible.

- Set a regular routine for play, meals, homework, and bedtime. Establish a quiet spot for homework. At age ten, children begin an intense growing period as they develop toward preadolescence. A regular, established bedtime, allowing at least nine hours of sleep is advisable.

- Get to know their friends and their friends' parents and continue open communication with the school. Inform teachers of any significant changes within the household that might affect classroom behavior or performance.

- Involve children in daily chores at home. Self-esteem is strengthened when children know you depend on them for help. Children at this age should be able to follow multi-step directions. Give clear directions and ascertain that they understand them. Whenever possible, allow children to complete the steps independently. Some ways children can help at home:

  Set the table for meals
  Take responsibility for a repetitive housekeeping task
  Help with cooking and food preparation
  Make gifts

- Encourage children to write in a variety of forms for different purposes, such as:

  A friendly letter to a relative
  A thank you note for a gift or visit
  A daily journal
  A recipe of a favorite dish.

- Ask children to give reasons for their decisions and opinions:

  Why is that your favorite?

What is the reason that you decided to do that?
What is your opinion about the story we read?
Why do you think that happened?
What were you thinking when you solved that problem?

All families want happiness and success for their children. Parents can ensure their children's success by taking an active interest in their interests and valuing them for the same qualities that they value in themselves.

Home and School Communication

The Step by Step Primary Program proposes that regular communication between school and parents is important for many reasons. Open channels for communication are established from the very beginning of the school year. Opportunities to meet and talk about the program, the children, and desires of the parents are an established part of the plan for the entire year. The Step by Step Primary Program recognizes that demands on parents are many and varied. With this consideration, it offers a variety of options for communicating in order to accommodate many different schedules. A time to meet with the teacher before school begins in the fall is an established part of the school calendar along with parent conference days which are scheduled twice during the year and at the close of school. Teachers and parents also have informal conversations to discuss issues or concerns as they arise during the school year.

Additional ways of maintaining regular communication with parents about school activities are:

- Weekly or monthly newsletters: These letters provide information about the many activities which the children have been involved in. They are a good vehicle to let the parents know of the learning that happens while children are involved in projects in the classroom.

- Parent group meetings: The parents meet as a group to plan volunteer projects for the school or their children's class. They may wish to discuss issues about education or concerns about stages in development. The principal attends these meetings and is available to provide educational expertise in the discussions.

- Morning coffees: This early time of day is often convenient for parents who work to meet with the principal or to hear a presentation and have a discussion about educational topics. Teachers announce the topic to be addressed ahead of time, usually in the weekly newsletter.

- Lunch time meetings: Parents come to hear teachers present activities that are successful with children, and that can be done at home. These informal sharing times give parents and teachers a chance to collaborate on positive strategies which work well with children.

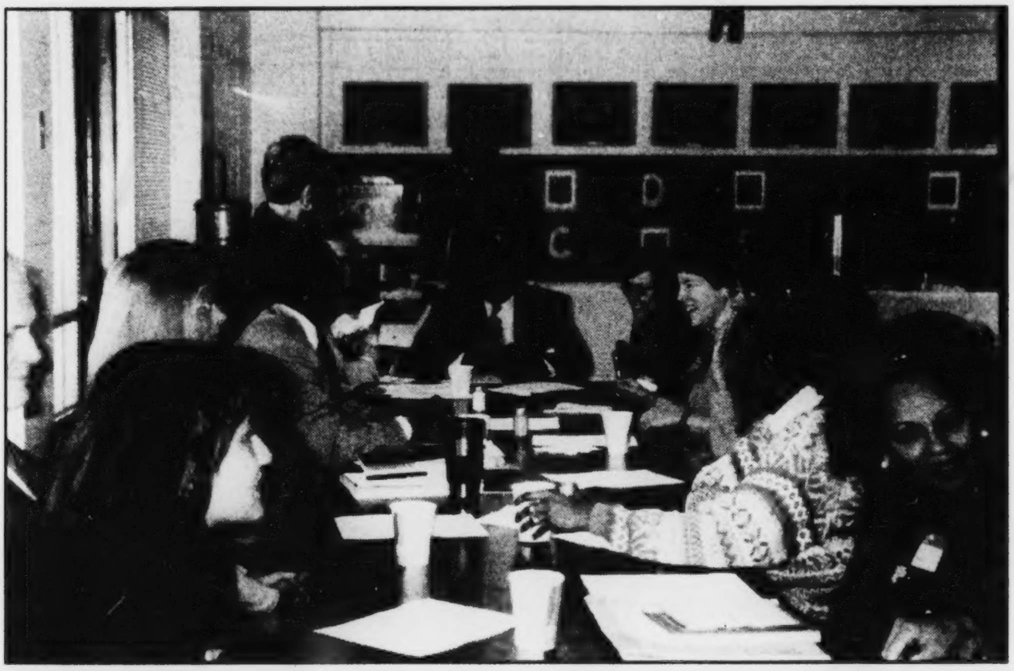
- Book sharings: Parents and teachers share books about good child-raising practices. This can be accomplished in two ways. Either as a written review done by a parent, or through a book discussion group. These are informal meetings of interested parents and teachers who agree to read the same book and gather to share their ideas and thoughts

- Festivals and celebrations: These celebratory occasions involve the children, parents, and teachers. Festivals are held for many reasons, such as historical or community events, anniversary of the school, seasonal celebrations, or a significant development in the life of the school.

On-going, regular communication benefits everyone in the school community: parents, children, and teachers. Children especially benefit from seeing the significant adults in their lives working together toward a common goal; it increases their sense of security and confidence. Children enjoy the feeling of connection between their families and school. As children grow older and their friends take on new importance, the connection among families through school becomes a significant way for parents to know their child's friends and their families.

Parents who visit their child's classroom get a realistic appreciation of their child in a school setting. They are encouraged to share their talents, interests, and expertise as positive models for all the children. In this way, parents and children grow in mutual pride and respect. This is especially important for eight, nine, and ten-year-olds as they are able to see their parents in a new way. Parents, too, gain a perspective as they observe and work with their children in the classroom. They are able to develop a greater awareness of their children's daily experiences.

Experience has proven that difficult issues are more easily addressed when channels for communication are already functioning well. In this way, both teachers and parents have a beginning point from which to work toward resolving disputes, if they arise. Providing parents with options to become involved with children's learning is important so that parents know that the school is willing to make every effort to accommodate their needs. Teachers encourage them by offering different times for scheduling meetings, by providing child care during the meetings, and by furnishing refreshments.



The Step by Step Primary Program encourages schools to designate a special place in the school for parents. The parent room should be comfortable and home-like with a table for meetings, chairs and a sofa, book shelves and materials for writing and note-taking. When a school provides this place for parents, it sends a clear message that it seriously wants parent involvement and respects the contributions that they can make.

The Step by Step Primary Program actively promotes parents as partners. With this goal in mind, the Step by Step Primary Program endorses the establishment of a Parent Association. The purpose of a parent association in a school is to provide a direct link among all the parents, and between the parents and the school. These adults recognize their shared commitment for what is best for their children as they grow. A parent association is an accepted way for parents to become regularly involved in the school as volunteers, or simply to visit their child's class to share a favorite story. All parents are encouraged to take advantage of the many opportunities that they have to become part of the life of the school and extend the sense of community to their homes through the parent association. Parents who are active in the association work with the principal of the school to create programs for parents and teachers about current educational practices, theories, and programs. The numerous roles available to parents as volunteers should not be limited to those listed in the preceding section. Parents should pursue their interests and ideas as they work with the principal to establish a network of support for the school.

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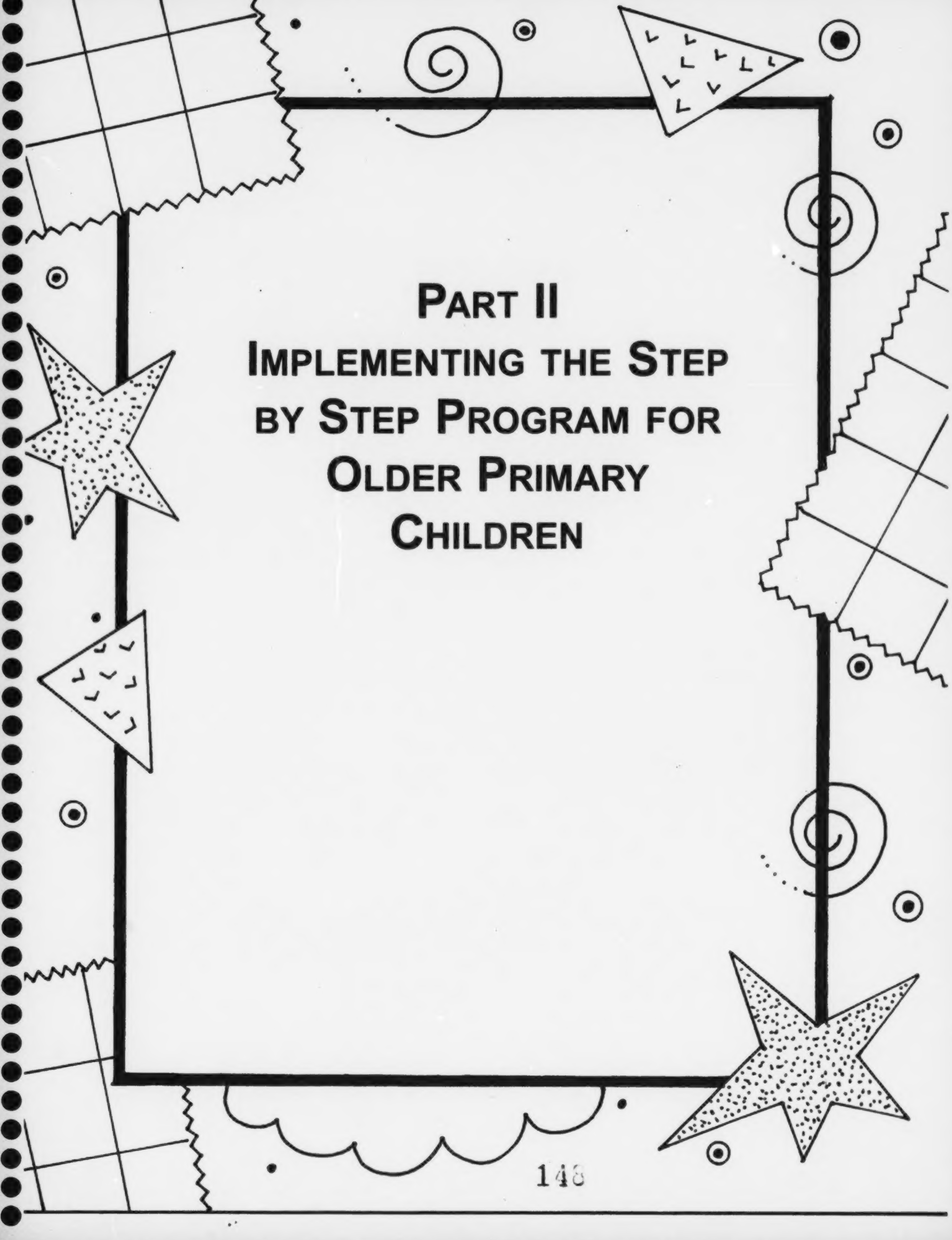


PART II
IMPLEMENTING THE STEP BY STEP PROGRAM FOR OLDER PRIMARY CHILDREN

IX. LITERACY

IX. LITERACY

When children bring their lives into the classroom and we come to know those lives well, we cannot help but want to enrich them. Teachers of writing and reading throughout the world have come to care passionately about workshop teaching, in part because reading and writing are ways in which human beings find significance and direction, beauty and intimacy, in their lives.

Lucy Caulkins

Reading, writing, speaking, and listening are communication tools with which the eight, nine, and ten-year-old child is becoming more proficient. As children move through the primary grades, they solidify and refine their reading skills. The children's motivation changes. They now read to learn, while before they focused on learning to read. Children recognize the admission into the adult world that literacy provides. A child whose environment is immersed in words, both language and print, will be highly motivated to understand the meaning of those symbols. Teachers and parents demonstrate the purpose and usefulness of literacy skills in their daily routines. Adults who include children in daily tasks of writing lists, letters, and notes; reading mail, instructions, recipes, magazines, newspapers; and other correspondence are powerful models for children of the relevance of literacy skills. Children grow in their independence as their reading skills develop, as significant learning occurs, and as they become more independent within the world of literature. They come to enjoy reading and choose to read for pleasure as they discover new worlds in books.

Speaking and listening activities help children learn to become effective communicators. Project work in small cooperative groups, whole class sharing times, oral reports and presentations, informal poetry readings, and drama presentations are all opportunities for children to practice developing language skills. Creating these kinds of activities in the classroom is a practical goal of the literacy component in the Step by Step Primary Program.

Reading, writing, speaking, and listening become important tools for children as they are required to use study and research skills. The older primary students engage in basic research to find solutions to problems that they encounter and the questions that they ask. In this way, children begin to understand the purpose of literacy skills and how different content areas relate. Teachers encourage children to make this kind of connection each day.

The following section presents the components of the Step by Step literacy program. It discusses methods for establishing classroom processes that facilitate the growth of reading, writing, speaking, and listening skills. Goals of the program are described. Specific classroom activities and examples illustrate the ideas presented.

General Goals for Literacy

A strong literacy program builds confidence in reading and writing abilities. An appreciation of literature and pride as readers and writers are goals of the Step by Step Primary Program for eight, nine and ten-year-olds. The components of literacy: listening, speaking, writing, and reading are taught through an integrated approach to traditional content areas and direct instruction.

A child's teacher fosters the enjoyment of reading, writing, listening, and speaking and creates the conditions for learning by:

- Promoting a safe and loving environment in which the children are comfortable to take risks
- Reading aloud to the children daily to enhance their love of literature
- Providing opportunities for the children to ask relevant questions and be attentive listeners
- Assigning time each day for the children to read quietly to themselves and to write
- Providing opportunities for children to interact meaningfully with text and each other

Through these learning conditions, once established and consistently implemented, children learn to:

- Take risks and express themselves
- Love literature
- Ask questions easily

- Be attentive listeners
- Be independent readers
- Write for their own purposes
- Find meaning in literature

Listening and Speaking

Talking is a powerful intellectual tool. In *Whole Language: Getting Started...Moving Forward,* Crafton asks, "Who does the most talking in your classroom? It's probably a good index of who is doing the most thinking" (1991, p.12). Researchers have taught us a new appreciation for talk. We need to interpret, to shape, to represent experience.... One way of representing, interpreting, and shaping experience is by talking about it" (Britton, 1982, p. 100).

Talk builds a sense of community. Fred Rogers, an expert on child development has said about children, *They long to belong. Many children don't know what they belong to." Talk in our classrooms links child to child and each child to the group. The sense of belonging rises and falls on "the sea of talk on which all our school work should be floated* (Britton 1982, p. 110). It is important to establish rules, as a class, on how to be good group participants and group listeners. Brainstorming as a group and making a chart listing these rules will be helpful reminders and reference points throughout the year.

Children learn from their peers. Eight, nine and ten-year-old students are able to sit and listen attentively to group discussions. They are able to draw from their own experiences and relate it to other's experiences. This helps build rich discussions and makes interaction among the students during the learning process vitally important. When children hear each other's thoughts and ideas, it helps the whole community grow. In process learning, we spend a lot of time together talking about books, sharing stories, discussing our view points. Reading and writing discussions also let us know, as teachers, what our students are learning and how they think.

> *Talking together lets students stand on each other's shoulders as they become joint creators of meaning. When partners work on a response and share ideas the response is enhanced. When students talk together or with teachers, meaning is refined and improved.* (Frasier & Skolnick, 1994).

The foundation for active citizenship lies in the ability to define and communicate one's own point of view and understand that of others. The Step by Step Program works to lay such a foundation through the development of listening and speaking skills.

Goals for Listening and Speaking

Develop an appreciation of language and literature.

Listen to teacher and fellow students as a member of a large group.

Show respect for peers' ideas and opinions.

Offer pertinent comments during group activities.

Use voice intonation to give meaning.

Expand vocabulary.

Understand and respond to single and multi-step directions.

Share personal experiences in a group.

Use vocabulary appropriately.

Follow the main idea in conversation.

Enunciate clearly.

Contribute ideas with confidence.

Expand specificity of vocabulary (example, use nouns in place of slang or pronouns).

Activities to Promote Goals

- Participation in discussions, role playing, and drama
- Book shares with teachers and peers
- Listening to and giving instructions
- Discussions of stories read aloud
- Recalling stories
- Recitation of poetry
- Dramatization of stories, poems and plays

Reading

Reading Overview

Enabling students to become readers necessitates having high expectations for all students, adapting teaching styles to fit student needs, immersing children in good literature, and giving children lots of opportunities to read each day. In a Step by Step classroom, children read with a teacher, with peers, and independently. The teacher listens, observes, and designs instruction based on individual student needs. This responsive style of teaching encourages children to develop their reading skills and to view themselves as readers.

When organizing a classroom, a Step by Step teacher provides a variety of reading experiences for his or her students each day. Creating balance in a reading program involves scheduling the following components into each school day: reading aloud, shared reading, guided reading, and independent reading. Each of these areas will be discussed in the following pages.

Specific Goals for Reading

The following is a list of learning outcomes that correspond with a well integrated reading program for eight, nine, and ten-year-olds.

Students will:

- View themselves as readers
- Read in a variety of genres
- Take risks without fear of making errors
- Increase fluency and ability to read text independently
- Retell stories
- Read for meaning
- Share their reading with others
- Understand basic literary elements

The Reading Teacher's Role

The teacher's role in guiding reading instruction for her students is a multi-dimensional one. Preparing a well-balanced reading program that appeals to many different ability levels is a necessity. A skilled reading teacher will recognize students' reading levels and plan instruction accordingly.

One of the most important functions a teacher has is providing children opportunities to take responsibility for their own reading. This means encouraging risk-taking, predicting, and practicing of strategies throughout the day.

The following observation guide, taken from an article found in *The Reading Teacher,* (November, 1991), can be useful when used as a self assessment in evaluating a teacher's reading instruction:

In your classroom, are you:

- Modeling and sharing your own joy of reading?
- Recommending books of interest to students?
- Providing a variety of literary genres (e.g., short stories, novels, poetry, biographies, essays, informational books, magazines)?
- Providing time for daily, self-selected silent reading?
- Reading aloud to students on a daily basis?
- Requiring a minimum of oral reading practice by the students?
- Incorporating thematic units in language arts instruction?
- Providing skill instruction for those who need it, not in isolation but within meaningful contexts?
- Utilizing a variety of grouping strategies for instruction (e.g., whole class, flexible small groups, partners, cooperative learning groups)?
- Providing opportunities for students to read independently and work individually on some tasks?
- Utilizing strategies that promote discussion, divergent thinking, and multiple responses?
- Assigning reading tasks that promote collaboration and cooperation among students?
- Planning reading tasks and strategies that activate and utilize students'prior knowledge before, during, and after reading?
- Asking questions that encourage and promote dialogue, inquiry, and critique?
- Encouraging a variety of responses to literature and to questions that are asked about the literature?

The Importance of Reading Aloud

All reading experts agree that reading aloud to children each day is the single most important activity to build reading success. Reading aloud to children in school each day is imperative. In addition, parents also should be encouraged to realize the modeling effect on their children by reading at home.

Jim Trelease, author of *The New Read-Aloud Handbook,* (1982), states that reading aloud to children is the best advertisement for learning reading because it works. It allows children to sample the delights of reading and understand that reading is a pleasurable experience, not a painful or boring one.

When teachers read aloud to their students, the following is accomplished:

- By exposing children to the rich and textural language in books, reading aloud strengthens a child's skills in reading, writing, and speaking.

- Reading aloud improves a child's listening comprehension. Developmentally, children listen to stories before they begin reading. Listening to stories builds their oral vocabulary, prior to reading and writing the words.

- Reading books aloud expands students' experiences. Children build their knowledge base and realize their own thoughts and feelings about the message in the text.

- By reading good books, teachers provide children with a quality model. During independent reading time in the classroom, children will gravitate to books read aloud in the classroom.

- Reading aloud entertains, soothes, arouses curiosity, and inspires. Teachers can demonstrate how books provide meaning in their lives.

- Children naturally will emulate fluent readers when teachers provide them with positive role models as readers.

Before reading a book aloud to the class, it is important that the teacher first read the book to be sure it is appropriate for the grade level. Previewing the book also will help familiarize the teacher with the language in the book.

In planning to read aloud, it is helpful to:

- Be dramatic, experiment with different voices, tones and intonations.
- Select a variety of genres to read: fiction, nonfiction, poetry, biography, drama/play, diary/journal. The books should be both picture and chapter books.
- Invite children to gather around on a rug to listen to the book, thus creating a cozy, warm environment.
- Choose interesting and exciting reading, so that you can hold the attention of your students and stretch their imaginations.
- Make the book available to students after reading a book. Some will want to try to read the book on their own.
- Allow discussion after reading a book so that students can respond to the book informally. Often children will respond to the book's "aesthetics" (attending to their feelings or information in the book), rather than just to the "efferent" or information gained in the book. This type of discussion is not based on teacher questioning, but on authentic student responses or reactions to the reading.

Shared Reading

During shared reading, students and the teacher read together from a book, preferably with enlarged print (a big book), a poem, or song written on chart paper. The teacher's intent should be to provide a cozy, communal atmosphere where children join in the reading as they feel comfortable and able to do so. This reading method also allows the teacher to model reading strategies and skills while reading the text.

Although shared reading is an important technique to use with beginning readers, it also has its benefits with developing readers. Among these benefits:

- Children gain a sense of enjoyment and excitement from shared reading, thus promoting reading as an interesting activity.

- By reading and rereading a book, poem or song, children develop their comprehension. The first reading may be beneficial to children in decoding unfamiliar words, where multiple readings also enable children to focus on the textual meaning. This technique is ideal to use when the text becomes too difficult for some children to read independently.

- Shared reading can be used with the whole class or with small groups of children.

- Materials used can cover a variety of genres including: poems, rhymes, songs, traditional tales, contemporary stories, and nonfiction.

Before engaging a group of children in shared reading, it is important to preview the book to determine if it is appropriate for the instructional level of the group. Next, the teacher should decide on the focus of the reading. Perhaps it is to introduce a concept, reinforce a reading strategy, or just enjoy a story. Prior to the actual reading, the teacher should begin by setting the scene, talking about the title, author, illustrator, and illustrations on the front and back cover. This should arouse the group's interest and foster motivation to read the book. Though the discussion is brief, the teacher guides the children's attention by asking leading questions so the children are predicting the story plot and think about characters.

While reading the text for the first time, the pace should be spirited, and participation should be encouraged. As always, some children will participate, while others will choose to listen before they are comfortable reading with the community.

During successive readings, children should have opportunities to participate in the reading. The learning outcome of the rereading will be different for each child in the group. Some will develop the ability to comprehend the story line and master unfamiliar vocabulary, while others will recall the text's rich vocabulary, character traits, author's style, and other facts or details.

A great way to reinforce reading is to provide the children with their own copy of the text. Once again, this builds word recognition, reading fluency, expression, and comprehension, and it encourages children to work on their reading strategies independently.

Guided Reading

During guided geading, a teacher will work with a small group of students (four to six) based on students' needs and guide them through a selected text. In guided reading, the teacher's role is to help the children develop and practice reading strategies. It is important to note that guided reading is reading by children; this means that the children should be able to take responsibility for reading an unfamiliar book. If they are able to read the selected book by themselves, they do not need a guided reading lesson, and they may read the book independently or with a partner. Conversely, if the book is too difficult, the teacher should read it to the children in a shared reading format.

It is extremely important to select a text on the students' reading level, so that the text offers only surmountable challenges, just enough to exercise and extend their skills, but not too much so they do not become discouraged. This is called *successful challenge.*

The chosen books closely match the children's reading needs, abilities, and interests. When students are challenged by the text, the teacher supports them by asking them to use known reading strategies.

A suggested format in teaching a guided reading lesson follows:

1). Before reading, the teacher sets the scene by:

- *Introducing the book* — reading the title, author, illustrator; talking about the illustrations; initiating open-ended questions that promote a discussion about the book.

2). While the children are reading, the teacher:

- *Asks the children* to pause at specific places, focusing their attention on vocabulary, grammatical conventions, specific story line details, character analysis, etc.
- *Encourages the children* to make predictions about the text or to reveal facts learned.

3). After the children have completed their first reading, the teacher:

- *Invites discussion and questions* students about their reading.
- *Asks questions* that allow opportunities to investigate the story line, characters, the mood, plot.
- *Allows rereading of the text*, either independently or with a partner.

Independent Reading

In addition to providing time to read aloud daily, teachers need to allocate extended periods of time each day for children to read books independently. It is during independent reading that children

begin to practice their reading strategies, build their word recognition vocabulary, and develop reading competence and confidence. Independent reading time should be viewed as an integral part of a balanced reading program. Children need time to develop their own sense of pace and independence in reading.

By providing children an opportunity to browse and select a suitable book to read, a teacher is enabling children to:

- Take responsibility for selecting a book and learn how to make choices.
- Practice the skill of reading in a real situation, rather than in an instructional setting.
- Develop reading interests and preferences.

Teachers can assist students in making book selections by:

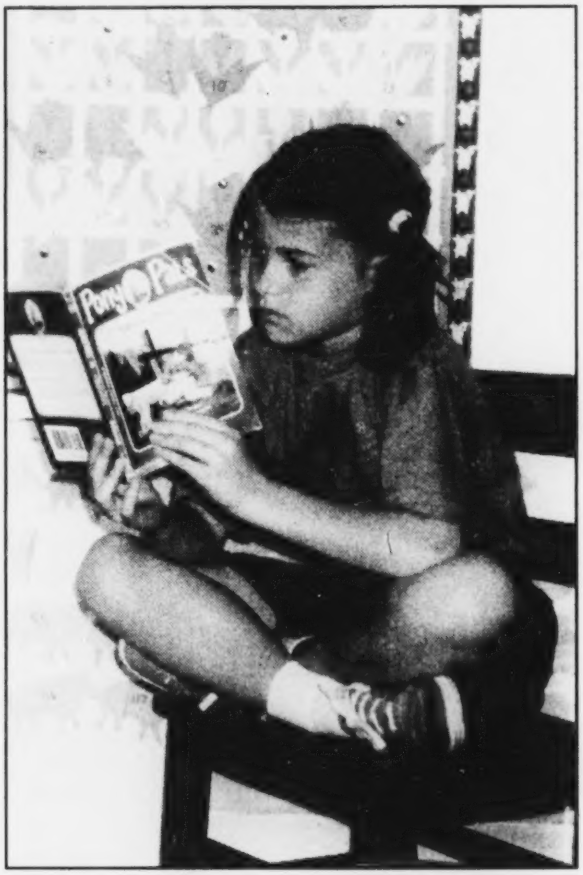
- Reading a variety of genres in the classroom (fiction, nonfiction, biographies, poetry, plays).
- Displaying books in the classroom and allowing children the time to make book selections.

Teachers' observations during independent reading can be instrumental in planning individual reading conferences (meetings) with students:

- Does the child constantly read books that are too easy, too difficult or appropriate for his/her instructional level?
- Does the child seek help from the teacher or peer when encountering difficulty with a word or with the text?
- Does the child read alone or with a friend?
- Does the child become so involved in the story that he or she is unaware of current surroundings?
- Does the child return to a text, reading it over and over until mastery is achieved?

Reading Responses

Children respond to books in many ways. Reading response activities should return students to the text to: deepen their understanding of the story, expand their thinking, bring new information in the text to their attention, and build reading fluency. The best reading responses are meaningful activities rather than exercises that fill time. While doing them children rethink, reread, rewrite, and retell.



The following list offers the different ways students can respond to their reading. They can:

- Read the book independently
- Discuss the text
- Illustrate the printed text of the story to make a book or wall mural
- Retell a favorite part in a story
- Retell by dramatizing the story
- Write a personal response to the story in a journal
- Create movement to accompany a poem or song
- Sequence the story, writing out sentences about the plot for a book
- Fold a sheet of paper in three sections and write what happened at the beginning, middle and end of the story
- Complete a web describing characters in the story, listing character traits

Allowing time to share reading responses in the group gives children an opportunity to develop their listening and speaking skills and provides them with a purpose for their responses.

KATE
Lauren

Examining Reading Comprehension

Reading for meaning is paramount to being a successful reader. Reading with comprehension demands thought: problem solving, inductive and deductive reasoning. The understanding that takes place when a child reads a book is related directly to the child's language abilities and personal store of experiences.

Reading instruction can play a key role in developing a child's comprehension. A successful program of comprehension instruction should include:

- Time for actual reading of a text

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- Practice in comprehension strategies
- Peer and collaborative learning
- Consultation between student and teacher to talk about their responses to reading

When teaching comprehension strategies, teachers can help students understand what they are reading by *demonstrating* how they themselves use real strategies. Depending on the focus of the lesson, a teacher may select a passage to read aloud, while students follow along silently. The teachers will verbalize or "think aloud" their thoughts while reading. They could:

- Make predictions, based on background knowledge
- Describe visual images
- Discuss the main idea
- Talk about a confusing point
- Demonstrate reading strategies when approaching an unfamiliar word

Offering students opportunities to practice their strategies in groups is critical to their learning. During guided practice, teachers will monitor students' use of strategies and offer support when necessary. If the strategies are practiced in a group, students receive the benefit of listening to what their peers are thinking.

Parents, as well as teachers, should be encouraged to help develop their child's reading comprehension. They can help to accomplish this by asking the following questions when reading at home with their child:

What do you think will happen next?
What more could the characters have done?
Can you retell the story? (To instill in children sequencing and placing story events in chronological order)
Can you make up a different ending?
What do you think the author was trying to say?

What was the mood of the story?
Who are the characters? Do you think or feel similarly to any of them?
How do you think a character felt when _____?
Can you summarize the reading material?
What facts can you recall?
What was your favorite part?
Does this book remind you of anything?

Students should always be given the opportunity to discuss what they have read. This can be done in the class group, in a small group, or individually in a reading conference. The individual response is the building block of comprehension. Individual responses can be classified in two ways: efferent reading, from which a reader derives information and basic meaning; and aesthetic reading, in which the reader derives pleasure from responding personally to the text. The teacher's role is to balance individual interpretations and explain important features of the text.

Reading Strategies

All successful readers use reading strategies without thinking about them. Successful readers predict, make inferences, draw conclusions, and summarize. Children who are developing readers require instruction in learning and using reading strategies. Teachers need to model the strategies and encourage children to use what they know to develop new strategies. Developing readers need periodic review and practice. This practice can be done in a whole group, in small groups, or individually in a reading conference.

The following is a list of reading strategies:

Orient students to the book – Examine the parts of a book: front and back cover, illustrations, author and illustrator, table or contents, etc.

Approximate and guess – Using background knowledge and story context, skilled readers approximate or guess when they approach an unfamiliar word. In some situations, it is necessary to reread the text or examine illustrations to gain further textual meaning.

Make predictions – Skilled readers make predictions before and during reading. While engaged in the text, successful readers update, confirm, or reframe their predictions.

Continue reading, then reread – After identifying a difficult part in the text, good readers continue reading, then reread the part for added meaning. It is suggested that students may want to form pairs or groups when added assistance is needed to determine the meaning of a text.

Pause, think, and retell – Pausing after reading a picture book helps children to recall the sequence of the story and important details. While reading longer texts, students should be encouraged to stop only a few times so that the flow of the story is not disrupted. Contemplation can add to a child's reading comprehension, and a teacher can demonstrate this technique to the class.

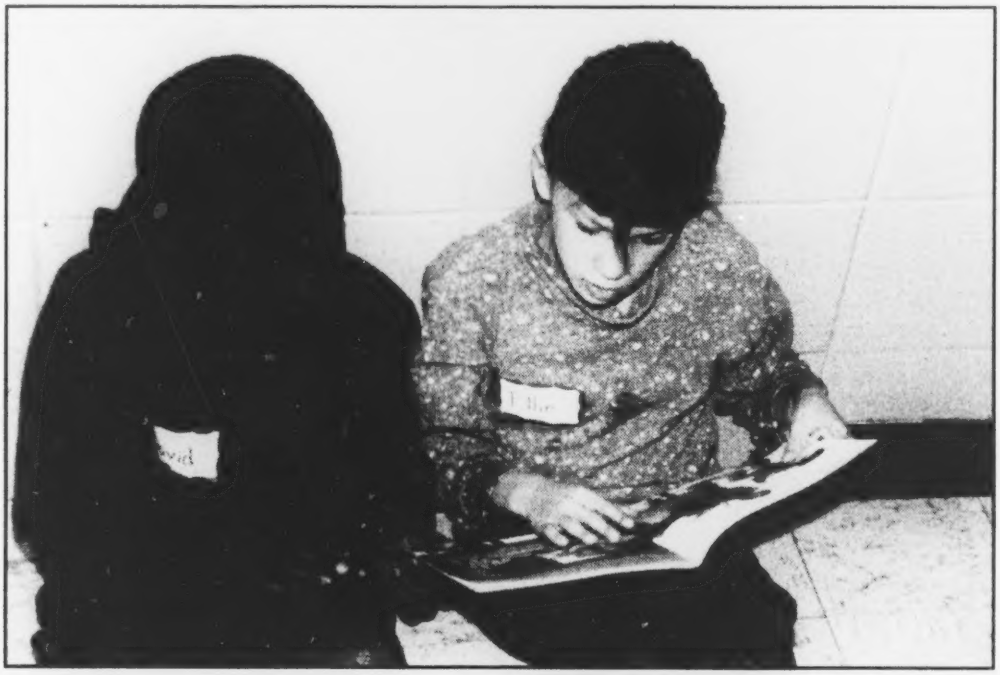
Engage in multiple readings and retellings – When a student rereads a lot, reading comprehension improves greatly. Details are committed to memory and reading fluency is strengthened.

Think aloud – Students are given opportunities to verbalize the strategy/strategies they are using. Teachers model thinking aloud and children can practice this skill with partners.

Use mental imaging – Students form visual pictures in their heads while reading. Mental Imaging can increase reading comprehension. Images dealing with: characters, setting, plot, should be verbalized in whole groups, in a small group, or individually.

Do the K-W-L – This strategy is useful when reading nonfiction. It consists of three questions: What do I Know?; What do I Want to know?; What have I Learned? This technique helps students set goals for their reading. This is a useful tool when studying a particular theme.

Make inferences, seek connections, and draw conclusions – Demonstrating these strategies helps students realize how they automatically infer and draw conclusions in everyday life. Analyzing their reading impressions and responses to the text allows students to practice this strategy.



Summary

In a Step by Step classroom, the teacher's goal is to provide daily encounters with good literature. Teachers have the power to show their love of reading and emphatic appreciation for books. Reading in the classroom is not just a solitary activity but a social one. Step by Step teachers set aside time each day for children to read independently and with others. When sharing a book, teachers realize that reading can bring their students together and establish a community. The community not only shares ideas and information but emotional experiences through literature. These experiences provide a common ground for building a strong sense of community in a Step by Step classroom for eight, nine, and ten-year-olds.

> *The reason that many of us care so much about the teaching of reading and writing is that we, too, have found that when we give children of the world the words they need, we are giving them life and growth and refreshment.*
>
> Lucy Caulkins

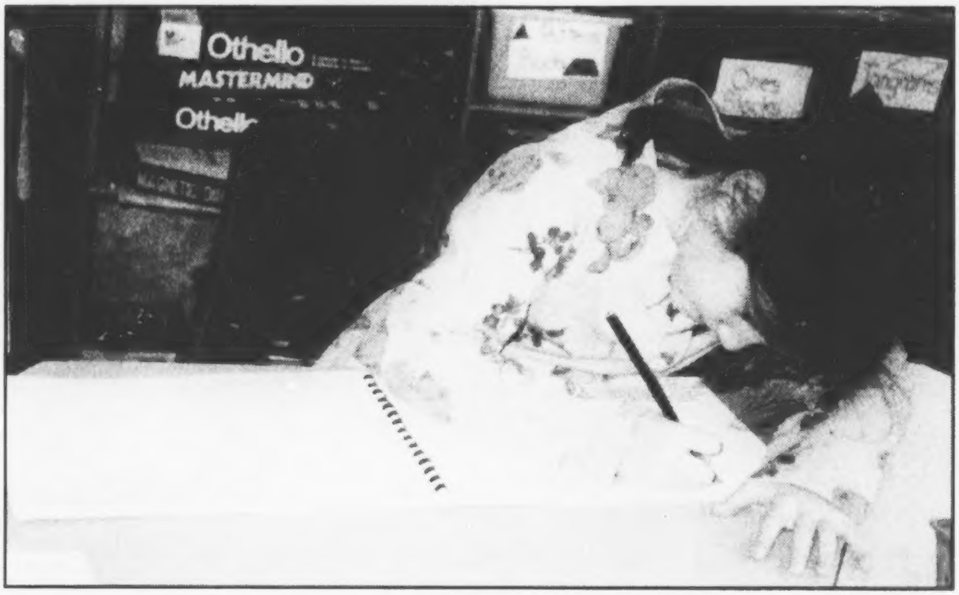
Writing

Overview

In the Step by Step Primary Program, it is our belief that children learn to read by reading and learn to write by writing. An environment that provides many experiences in reading and writing also offers opportunities for confidence and growth in these areas. Children's thoughts as authors are valued by their peers and teachers. Teachers provide them with a safe environment where their voice can be freely expressed and heard. It is also important for each child to feel valued and respected within the classroom. Setting up this type of environment within the classroom is of the utmost importance.

It is common to find that children of eight, nine, and ten years of age exhibit a wide range of abilities in all developmental areas. Some students are comfortable drawing pictures to express themselves, others are able to write detailed stories filled with description and dialogue. The appeal of this type of program is that each child is able to work at his or her own pace and achieve success. Teachers individualize to meet the developmental needs of their students. The goal is to build the self-esteem of each child and to help them become life-long writers.

The Step by Step Program presents writing in two distinct ways. First there is a strong emphasis on creative writing. Second is a presentation of skills and continual refinement



for grammar and spelling. There is a distinct difference between the ideals of creative writing and the skills in learning penmanship and script. Penmanship is a skill to be developed during primary years and should be taught at a separate time from creative writing. The focus of this writing program is to allow the children to express their ideas freely on paper and to write for meaning.

Children need to be in a language rich environment. Reading aloud to children daily provides them with many opportunities to hear how different authors use language. They love to listen to stories and this often becomes one of their favorite times of the day. Rich discussions follow as children share personal experiences and viewpoints with each other. Children also need time to read each day. They should be exposed to a variety of genres such as: fiction, non-fiction, poetry, and prose. Reading helps feed a child's imagination and helps build an extensive vocabulary.

Children benefit from predictable routines. It is important for eight, nine and ten-year-old children to have a consistent time for writing everyday. They become more committed to writing when they know they can depend on this time and invest more of themselves in their work.

The following seven points are a framework of beliefs about writing. They have been adapted from Nancy Atwell's, *In The Middle*, 1987 (p. 17 and 18).

1. Writers need regular uninterrupted time to write.
2. Writers should choose their own topics.
3. Writers need response.
4. Writers learn mechanics in context.
5. Children need to know adults who write.
6. Writers need to read.
7. Writing teachers must take responsibility for developing their knowledge and teaching.

This framework shapes the content of this chapter as we discuss these beliefs.

Specific Goals for Writing

The following are learning outcomes that The Step by Step Program defines for children 8-10 years old. They will learn to:

- Enjoy the writing experience
- Sequence events
- Write for a purpose
- Write in a variety of forms (non-fiction, original stories, journals, poems, letters)
- Follow the steps of the writing process (pick a topic, brainstorm, write a first draft, conference, edit and revise, publish, share published works).
- Express ideas effectively
- Use punctuation correctly (period, question mark, exclamation point, quotation mark, comma)
- Use complete sentences
- Use appropriate grammar
- Construct paragraphs

From the first day of school we must leave control of the writing with the child: the choice of topic and the writing itself. (Graves, D., 1981, p. 8.)

The Teacher's Role

It is important to create a learning environment in which children feel safe and secure. They need to feel safe to take risks and succeed, as well as fail. Creating a learning community where each child feels respected and valued by their teachers and peers is critical. Only then will students truly be able to learn and write.

It is important to develop a bond of trust with each student. Children know that teachers care about them and have a genuine interest in their development and growth as students. Encourage them to take risks, explore ideas and to try different forms and styles of writing.

Teachers expose their class to good literature and read aloud daily. They write with the class, and share written pieces with the students, as an author. Teachers must be risk takers as well.

Authors should write every day. The teacher provides daily opportunities for the students to write. The students know that they can depend on this time. It gives them a sense of structure and predictability.

During writer's workshop (the name given to the scheduled time in which students are working through the writing process), the main job of the teacher is to circulate around the classroom assisting students who need help by listening and reflecting back what the child is saying. It is not to change the child's writing or correct it. It is to help nurture the growth and the stage of development of each child.

It is equally important for teachers to grow as writers and teachers of writers. Attending workshops, reading new publications and recent research will help continue professional growth. It will also provide new ideas and approaches for classroom use and fresh outlooks on how children learn. It is very beneficial for teachers to have the experience of working through the writing process just as students do. This gives a new appreciation of what is asked of children, and of how difficult writing can be.

One of the most challenging jobs teachers have is to continually reflect and revise teaching strategies to help meet the various needs of the children in the classroom. Observation and communication are critical in determining the needs of the individual students and the group. Some examples of how to do this are: conferencing with individual students, having children share ideas during group discussion, and by holding small and large group meetings to find out the children's understanding of the various guidelines established for the class.

Organization of Your Classroom

The following ideas are suggestions for arranging the classroom for the year. Individual desks can be grouped together in clusters of four. This helps promote conversation and sharing among students. Create an area for the whole class to gather together on the floor (preferably on a rug) for group meetings. If the space is available it is helpful to designate a small area where students can go to read or write quietly. Adding comfortable items and pillows to make this an inviting and cozy place for the children to learn is recommended. During writer's workshop, children can be more productive if rooms are designated for conferencing, quiet writing, and publishing. The more specific the classroom routines and guidelines are, the smoother the classroom will run and the more productive writer's workshop time will be.

A writing center is an important part of classroom design. It should be well organized and easily assessable to students. Students should be in charge of keeping it neat and well organized. These are suggestions of materials for a writing center, not necessarily required:

- Writing paper several different styles and sizes
- Envelopes
- Pencils

- Erasers (different styles and sizes)
- Construction paper
- Drawing paper
- Index cards
- Graph paper
- Scrap paper
- Heavy cardboard
- Book covers
- Hole punch
- Staplers
- Staple remover
- Rubber date stamp and pad
- Clip boards
- Rulers
- Paper clips (different colors and sizes)
- Scissors
- Tape
- Pencils
- Markers (broad tipped and fine tipped)
- Colored pencils

- Crayons
- Water color paints and brushes
- Dictionaries
- Thesaurus
- White glue
- Glue sticks
- White-out liquid
- Storage bin for permanent writing files

Teacher Tip

How to introduce the writing center:

In the beginning of the year, you should have a group meeting designated to discuss the special area that has been set up for writer's workshop. Ask the children to gather in the writing center area. Ask if they are familiar with any of the materials, and if they used the materials in writer's workshop last year. Allow the children the opportunity to share their thoughts. Ask if there are any questions about the materials. Next have the class generate rules or guidelines for how the center should be used, how to keep it organized, etc. Record their suggestions on chart paper. Set aside some time during the day for small groups of students to explore the writing center while the rest of the class is engaged in independent work at their desks. Post the rules the class has established in the writing center.

Classroom Management

When establishing a writing program, it is important to remember that students work at different paces through the writing process and will require help from the teacher at different times. Children of this age benefit from a clear understanding of class routines. Basic guidelines should be set in the beginning of the school year. These guidelines explain the routines that are established for the class. They help create clear patterns for movement around the room during writer's workshop. Clear management enables the children to work more independently and frees the teacher to work individually with students.

The following are classroom routines to help manage writers workshop. These ideas, directed to the student, help create a calmer more productive atmosphere in the classroom:

1. Write on a type of paper that is comfortable for you.

2. Write on one side of the paper.

3. Don't worry about correct spelling on drafts.

4. Do not erase your work when you make a change – draw a line through and make the change above it.

5. Keep all of your work.

6. Be considerate of others by keeping your voice level down.

7. Keep all finished work in your permanent writing folder. It is stored in a file box in the writing center.

8. When you need a peer conference, sign your name on the board under the PEER CONFERENCE sign. Students who have time to confer with a classmate to help, sign their name by the student's name.

9. When you need to meet with a teacher, sign your name on the board under the TEACHER CONFERENCE sign. (The teacher will then circulate around the room to meet with those students.)

10. When you are ready to type your piece on the computer or typewriter, sign your name on the board under COMPUTER. Set an egg timer for 15 minutes so that other classmates will be able to work on the computer.

11. Finished stories ready to be typed by teachers (if students are not typing their own or computers are not available) are put in a bin marked TO THE PUBLISHER. (These stories can also be typed by parents who volunteer to help with publishing.)

Children are able to be more successful and make more productive use of their time, when given large amounts of time to write. Allowing 45 minutes or more daily for a writer's workshop time is ideal. Writers need time to write. They need time to think, discuss, confer, and revise. They should know that they can depend on a schedule during the week that is consistent. This helps them to plan ahead and organize their weekly writing work.

Writing Folders

A pocket folder is given to each child to keep for the year. The following items are kept inside the folder:

1. A list of the steps in the writing process
2. A topic sheet to list ideas to write about during the year
3. Rough drafts or working copies
4. Conference sheets
5. A record sheet of what the student worked on in writer's workshop that day
6. A list of stories they have written during the year and dates finished
7. A sheet labeled Things __________ Can Do as a Writer

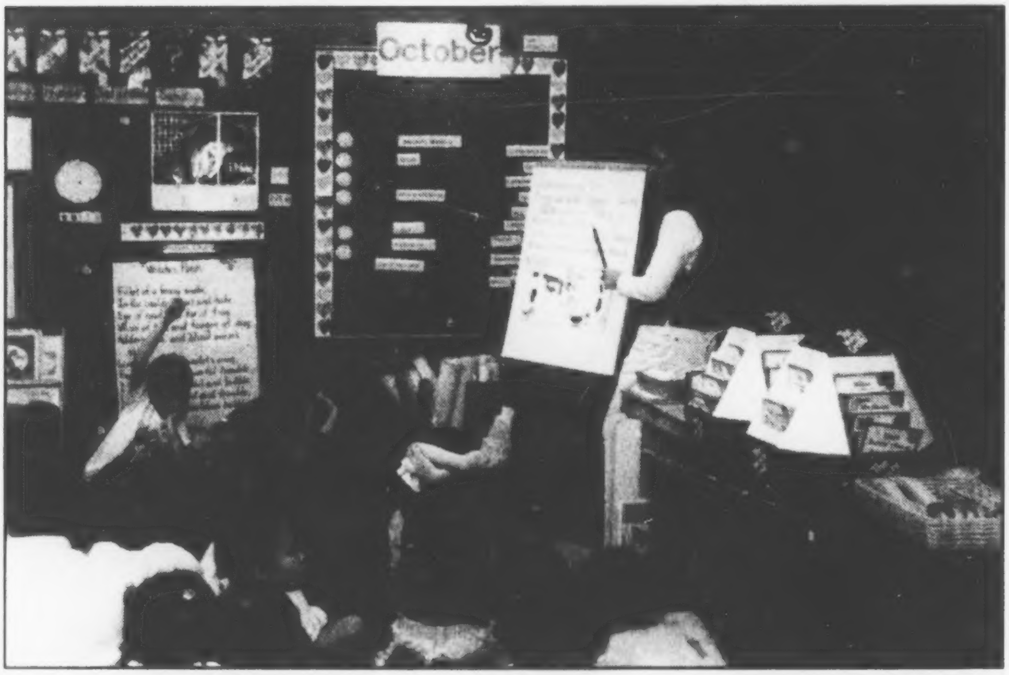
Group Meetings

Group meetings are an effective and intimate way to begin writers workshop. Students gather together on the rug as a group, with their writing folders and listen to a mini lesson. A mini lesson is a brief lesson on procedures or a relevant skill that the teacher teaches directly to meet curriculum requirements. The meeting should last no more than 5-10 minutes. Concerns of the students and questions of the group can also be addressed at this time.

Some mini lesson ideas include:

- How to pick a topic
- Steps in the writing process
- Materials available in writing center
- Conferring
- Editing and punctuation skills
- Publishing
- What makes a good lead sentence
- What makes a good ending
- Development of characters
- Using descriptive words
- Grammar lessons

At the end of the group meeting, it is helpful to have students tell briefly what they will be working on during writer's workshop. This is one way to individualize while teaching writing. The teacher quickly jots down the information on a chart by each student's name. This gives students an immediate focus and a direction for how they will proceed in their writing. This process of selection empowers children to be independent workers.



The Writing Process

A primary goal of the Step by Step Primary Program for eight, nine and ten-year-olds is to teach children the steps of the writing process. It is hoped that each child will realize the satisfaction of having a story published. Ideally this means a typed version of the child's story in book form. Children work best when they know what is involved in each step of the process and how to proceed through the process. Posting the steps of the writing process in the classroom provides visual instructions for the children to follow. It is important to have a consistent time that the children are able to write each day so that they invest themselves and become more committed to writing.

Steps in the Writing Process

1. Select a topic
2. Write a draft
3. Revise and edit
4. Publish
5. Author's Chair – Share the final written piece with the class.

Selecting a Topic

The first step in the writing process is for the students to brainstorm some topic choices that they feel would make a good story. It is important that children pursue topics of their interest so they become invested in their piece. Selecting their own topic allows children to take ownership of their writing. It is much easier to write about a topic that they are familiar with or interested in. Sharing of personal experiences during the group meeting helps generate ideas for students to write about. It might be a special vacation that they went on with their families, a biography of their life (a favorite among children this age) a story about a family member or a pet. The students will keep an ongoing list of topics in their writing folders that they might be interested in writing about during the year.

Some questions to ask which encourage the development of topic ideas are

- Would you tell us about your:
  - birthday
  - hobbies
  - weekend
  - friends
  - summer vacation
  - pets
  - family
  - favorite movie
  - favorite book
  - favorite sport
- Do you remember the first time you:
  - rode a bike?
  - lost a tooth?

scored a goal in a soccer game?

got hurt?

Questions to think about in choosing a writing topic are:

- What do I keep thinking about?
- What do I know a lot about?
- What do I know how to do really well?
- What is important to me?
- What do I want to find out more about?
- Who or what do I care a lot about?
- Who is someone important to me that I want to write about?
- What do I like to do?
- What was an important time in my life?
- If I can think back to an earlier time, what do I remember?
- What am I worried about?
- What am I happy about?
- What am I angry about?

The following is an example of a list of potential writing topics developed by an eight-year-old girl named Katie.

Topic ideas for Katie:

cats
Shelburne farms
Sandy pond
catching fish
Boket
Shelburne museum
dolls
Mitsy
fox
myself

Writing a Draft

Once the students select a topic, the manner in which they approach the topic will indicate their needs and abilities. Some will begin immediately, full of ideas to write about while others will need extra help in getting started.

Making lists is an enjoyable way for students to gather information that they want to include in their stories. They can also meet with classmates and brainstorm with them on ideas that might be interesting to include in their stories.

Mapping is a technique that helps authors gather information about a particular topic and organize it on paper. Most eight, nine, and ten-year-olds can take a topic that they are interested in writing about and develop a variety of subtopics that they might want to include in their piece. Spelling is not emphasized in the rough draft. Encourage students to sound out words they do not know how to spell, or use 'inventive' spelling. This frees them to express their creative ideas. Editing for spelling is done during the editing step of the writing process.

Conferences

> *Writers need response. Helpful response comes during not after the composing. It comes from both the writer's peers and from the teacher, who consistently models the kind of thoughtful, appropriate restatements and questions that help writers reflect on and rethink the content of their writing.*
>
> Nancy Atwell

Conferences are a very important and meaningful part of the writing process. They help young authors realize that they are writing for an audience. They give the writer the opportunity to read the piece out loud to a small audience, hear the story, and get feedback from the group. Students meet with peers and teachers for conferences.

The students think about the purpose for a conference and how their peers or teacher can help them. Common areas of difficulty in writing are: picking a topic, continuing the story once started, coming up with an ending to a story, finding a good title. Reading their piece aloud to a peer group helps authors clarify their writing. The role of the peer group during the conference is to:

Be good listeners.
Rephrase what they have heard.
Tell the favorite parts.
Respond to parts that they could see, feel, and hear.
Specify what they would like to hear more information about.

The following questions will help children express themselves during peer and teacher conferences. It is important to remember that the child should do most of the talking. These questions are taken from Graves' book, *Writers: Teachers and Children at Work*, 1983. Graves has divided these questions into three groups.

Opening Questions:

What's the piece about?

Why are you writing about it?

How did you get started?

What's your favorite part?

Following Questions:

These questions are often not really questions. They are often restatements of what has been written. For example "You said that you were scared...." The restatements are designed to encourage the child to give more information about his or her topic.

Process Questions:

These are questions that lead the child to talk about what he or she has done and to think about new avenues to take in developing the piece.

What do you think you'll do next?

I notice you changed your lead sentence. Why did you do that?

How do you feel about your story?

Are you happy with your beginning and ending?

Explain how your title fits your story?

What do you need help on?

Does the beginning of your piece grab the readers attention?

What questions do you have for me?

Teacher Tip

Plastic visors worn when children are having peer conferences or "advising a peer" are fun for young writers, and wearing them lets a teacher know visually when a peer conference is taking place.

Group Conference Sheet

Author Date

Title

Group Members

Acceptance comments from the group:

Questions from the group:

Revision ideas (your revision plans, areas to work on):

Attach to rough draft with paper clip

Revising and Editing

Donald Graves has re-named revising as *re-seeing* written work. The drafting process begins once children are able to *re-see* their written work. Revising and editing for children this age is based on changes the children decide to make. This reflects the child's developmental stage. Most children of this age group feel that their piece is just fine the way it is, "The End". As a young writer develops the craft of writing, revision becomes more acceptable. Most revision is done while typing up the final piece on the computer or typewriter with the teacher for publication. By the end of the school year, children will be able to edit their writing pieces for capitalization, punctuation, question marks, and conventional spelling.

During the editing process, have the student circle two to three words that *they* think are not spelled correctly. They then can look them up in the dictionary and add these words to their own personal dictionary. Students are encouraged to do their best when editing, however, most eight, nine, and ten-year-olds will not end up with a perfect piece ready for publication. Final editing is done with the teacher (or a volunteer parent) while typing the piece for publishing. A computer or typewriter is ideal if you have them available but finished copies can be hand written. All spelling and punctuation is corrected at this time. The final published piece is free of all errors.

Teacher Tip

Gimmicks are extremely helpful in motivating students who are not always eager to proofread their work for capital letters and punctuation. Making "super-bionic proof-reading glasses" (glasses that have "magical powers" to help locate mistakes) out of pipe cleaners are motivating for children. The glasses are worn only when the student is proofreading. Using special teacher markers and white-out are additional motivating materials for students to use while editing their stories.

Writing Check List

1. Is there a capital letter at the beginning of each sentence?
2. Is there punctuation at the end of each sentence?
   (. or ? or !)
3. Are there any words missing in your sentences?
4. Did you write a title?

Providing a simple checklist for children to help them assess their work is both beneficial to the child and the teacher. For the child, it helps clarify expectations for quality work and puts the child in charge of his own success. For the teacher, it helps to focus on standardized expectations for all good writers and eliminates repetition of verbal direction and expectations.

Publishing

Publishing is the final step in the writing process. After the students' piece has been edited by a teacher and typed up, the children decide how they want to present the story in a book form. Once they determine how many pages they will need in their book, they can put one together with the help of a teacher or use a pre-made book. It is helpful to have books of different sizes, shapes, and lengths made ahead of time in the writing center so that the children can move through this step smoothly without requiring teacher guidance. This is another area in which volunteer parents can be of great help. The students cut and paste their story in the book and add illustrations to the final piece. It is fun to add a dedication page to their piece and an *About the Author* page. Adding a photograph to the Author's page is a nice way to personalize it.

The following are samples of Author's pages taken from student-published books of children in the second grade.

October 7, 1996

About the Author

By Gabriel

I was born in Washington, DC. I am in second grade at Beauvoir school. I have a cat and two birds and a lizard. My most recent book published is *Mr. Kitty from Ocean City*. I play soccer in the Stoddart league. I collect baseball cards. I am 7 years old.

October 7, 1996

About the Author

By Sasha

Hi I am Sasha. I was born in Washington, DC. I still live here. I am 8 years old. I am in second grade. I have no pets. I would like to have a dog. I love to garden! I like to grow tomatoes, plants and other vegetables. My favorite sport is soccer. I am musical. I like to play the piano. I have practiced for two to three years. I have a girlfriend named Nicola.

October 7, 1996

About the Author

By Hope

I was born in Boston. I live in Washington, DC, Cleveland Avenue NW. I have a rat. She is very, very playful. I like to play soccer and I play goalie. I go to Beauvoir school second grade. I like to collect key chains and I like art. I also like rock climbing.

October 7, 1996

About the Author

by Chrystin

I was born in Washington, DC. I go am in third grade. I have a cat, a fish, and two hermit crabs. I like to play soccer. I like to collect key chains. I am good at writing. In first grade I wrote a book *Cat Land*.

Author's Chair

Sharing the final written piece with the class is a very exciting time for the young authors. Eight, nine and ten-year-old children enjoy reading their piece to an audience. When children are ready to share a piece, they write their name on the board under the "Author's Chair" sign and place their finished piece in a basket. A special chair is designated in the classroom as the Author's Chair.

The child reads the piece aloud to the class and shares the illustrations. When finished reading, the child calls on classmates who want to comment on the story. Extensive modeling by the teacher in the beginning of the year helps guide the students towards appropriate and meaningful comments. These responses should start with positive comments about the piece and then questions that they may have for the author.

The book is then sent home for the child to read to the family. Attaching a pocket and library card in the back of the book is a way for the teacher to keep track of books that are out of the classroom. The books are then kept in the class library where all students can enjoy reading them throughout the year. These books will be sent home as part of the child's portfolio at the end of the year.

Things ______________________ can do as a writer!

Name

Date

Subject

What I can do well

What I find difficult

What I am doing better

What I am going to work on next

How I am growing as a writer this year....

Name ____

List in order the stories that you have written in Writer's Workshop:

____

____

____

____

Put a red star by the story that you feel as an author is your best piece.

Why do you feel it is your best piece?

What is easy for you when writing a story?

What is difficult for you when writing a story?

How do you want to improve as a writer?

What are you going to work on in your next piece?

Evaluation

It is beneficial to have the children evaluate how they are growing as writers throughout the year. The process of comparing stories they have written and setting goals with the teacher about how they can improve as writers through writing conferences helps the children focus on one or two goals at a time. The following examples are samples of two young authors' evaluations of their progress throughout the year. The examples reflect two different developmental levels.

Things Eric Can Do as a Writer

I write well.

I focus well.

I write good stories.

Things Jamie Can Do as a Writer

I know the writing steps.

I can publish.

I know where to put periods, exclamation points, commas, and apostrophes.

I can take a subject and make it interesting in a book.

Group Share

Group share is a productive way to end writer's workshop each day. The class gathers together in the group area and members share what they are working on. It is a time when children can communicate about a particular area of difficulty in their writing. Sharing allows them to realize that others struggle with similar issues. It allows children to support each other and solve problems together. It also helps the children become aware of different problems that classmates are encountering. When children read a piece aloud to the group they are given immediate comments about what the audience understood and did not understand. *Group share* provides time for authentic responses and creates opportunities for mutual problem solving. Children learn to appreciate and draw on each other's talents and strengths.

Other Ways to Promote Writing in Your Classroom

Daily News

Create a board in the classroom where students can write news that they would like to share with their classmates. For example:

- My mother had a baby boy last night.
- My soccer team won our game yesterday.

Have the children write their name after their news and talk about the news during your morning meeting. This provides a public forum for communication. It is a helpful way to encourage children who are not always comfortable sharing their news verbally with the class.

Journals

Have the children keep a journal of events that are happening in their lives both in and out of school. Have them write in their journal a few times during each week. This becomes an insightful record of memories to add to their portfolios at the end of the school year. Occasionally giving the students topics becomes a helpful way for the teacher to find out some information about the children. For example, have the children write about:

- A goal that they would like to achieve in class during a particular week
- Something kind they did for a classmate
- Something that they are really proud of
- One thing that they learned recently

Teacher Tip

The following are additional ways to promote a variety of writing:

- Response journals for math and reading
- Learning logs for science
- Letters to authors and pen pals
- Self-evaluation of their work in all curriculum areas
- Poetry and plays
- Thank-you notes
- Comic strips
- Songs
- Commercials
- Newsletters
- Reviews of books, movies, toys
- Postcards
- Directions
- Summaries
- Book reviews
- Lists
- Memos
- Questionnaires
- Interviews
- Posters signs and charts
- Surveys

Writer's Workshop Log

Name______________________________

Date	Work Accomplished

Rough Draft - RD

Peer Conference - PC

Rewriting - RW

Editing - Ed

Meet with Publisher - MP

Publish - P

Writing Log

Name:

Topic	First Draft	Edit	Publishing	Response Group

Ways to Involve Families in the Learning Process

Family participation is a basic premise of the Step by Step Primary Program. Families are welcome in the school and classroom. Clear communication between school and home is crucial. Parents are an integral part of the school community. They are partners in the learning process both at home and at school.

The following are ways that families can promote their children's language development at home and help foster a love of reading and writing:

- Limit the amount of television that children watch. Be selective about the programs that are viewed.
- Be a role model. Let your child see you as a reader and a writer.
- Read to your child on a daily basis in a book that is above his reading level.
- Encourage your child to read aloud to you.
- Set aside a quiet time each evening before your child goes to bed to read quietly to themselves for 20-30 minutes.
- Set up a writing corner in your home and supply it with writing materials, pencils, paper, markers to encourage your child to write at home.
- Be positive. Do not over emphasize spelling, grammar and punctuation errors. *Encourage* your child, don't *discourage*.
- Write your child notes and leave them around the house.
- Encourage your child to write thank-you notes, letters, and postcards to friends and relatives.
- Keep a family journal when you go on a special family vacation recording different things you see and do together.
- Encourage your children to write in a diary where they can share private thoughts and feelings.

- Have your child help you make lists of items you need at the grocery store and errands that you need to do.
- Keep baskets full of good reading material in different rooms of your house.
- Provide your child with a lamp by the bed to promote bedtime reading.
- Help your child understand that writing and reading are enjoyable, meaningful activities that are integral in our daily lives.

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X. VISUAL ARTS

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Overview: The Value Of the Art Experience

In preparing students for the next century, it is important to take an approach that anticipates what educators believe children will experience in the arts. Although all the answers are not known now, it is clear that they will be exposed to advertising, consumer products, films, magazines, newspapers, books, and music. Indeed, they will be deluged with manufactured images in the years to come. They will have access to a great deal of information and much of it will be in a variety of art forms.

Experiencing and learning about art at an early age will give children artistic and aesthetic opportunities that can affect their judgment and understanding of their present and future. They need to be encouraged to become active participants in the arts rather than simply observers. They will learn to see and use art as a means of communication both visually and orally.

Children have begun to master the various symbols of artistic communication as preschoolers, kindergarteners, and six and seven-year-olds. These are golden years of creativity and enchantment for each child. Older primary children, in addition to understanding more about their world, continue to develop their visual vocabularies. They are learning to express themselves in various languages, through speaking, singing, dancing, and movement. Speech, of course, is the strongest mode of expression. At the same time, however, children learn how to combine these various modes of expression with the visual in creative and imaginative ways. The arts also complement other areas of learning and study–from science and social studies to reading and writing. Children develop a range of thinking skills that enable them to make connections and do creative problem solving.

Art experiences challenge children to invent new ideas and solutions. Art activities do not demand a single correct answer or response. They break away from the patterns of memorization and rigid true-false answers. For every creative problem there may be many thoughtful and correct answers. This kind of problem solving and reasoning is excellent training for working and living in the real world. Indeed, the work environment of the future will increasingly require varied kinds of reasoning and creative thinking.

By inviting and encouraging children to involve themselves in art experiences, adults immerse them in the learning process in new and exciting ways. They learn from the inside out rather than from the outside in. They are stimulated to sort out their individual reactions and feelings and to articulate them in a symbolic language using various art mediums.

The ability to think and work independently is a basis for creative and democratic thinking. It teaches and allows children to become lifelong learners. The arts also serve as a powerful educational tool in understanding humanity.

Quality art experiences result when teachers, parents, and children communicate and work together. These quality experiences:

- Help children develop their visual ideas and record their feelings and impressions.
- Give children a chance to individualize their perceptions and develop creative problem solving skills and judgment.
- Encourage imaginative learning and thinking through discussions and creative discoveries.
- Encourage children to develop artistic skills and craftsmanship through use of different art mediums.
- Promote responsible and purposeful work habits.
- Give children a better understanding of others while fostering a respect for those who are different.
- Promote learning about and understanding of other cultures as well as an appreciation for their own artistic heritage.
- Strengthen and enhance the school curriculum and community.

The Artistic Development of Eight, Nine and Ten-Year-Olds

In their preschool years, children seem to have a heightened creative period. They sparkle with enthusiasm for the creative. Their art work has a special charm and spontaneity. Children are inventive, imaginative, and energetic in their pursuit of any creative process.

As children progress and become older, teachers and parents may observe that the seven or eight-year-old is less challenged to be creative. Somehow children in this age group become more aware of their peers and their play becomes more determined by group rules. In the process, they may set limits on their creative thinking.

This stage in development often makes teaching eight, nine and ten-year-olds a more challenging task for teachers. They have to find new and different ways to nourish creativity.

Eight-year-olds:

- Are able to control their imagery with more dexterity. Fine motor skills are now more developed.
- Can focus and stay with a project for an extended period of time.
- Continue to evidence a "part-to-part" thought process in how they work. Details have more importance and they understand how shapes can relate to one another.
- Enjoy drawing more complex pictures. They are often interested in drawing a commercial image. They will draw and redraw this image until it becomes their own. This pattern of drawing allows them to gain control over an event or their feelings.
- Show increased focus on spatial organization. The ground line in a drawing or painting is now elevated. The sun, moon, and sky begin to touch the land. Visual symbols representing people, houses, and objects are more in scale and often on the elevated ground line.
- Enjoy sharing ideas with friends. They like to work with partners and build constructions together.

Nine-year-olds:

- Are often more self-conscious about their work. They are more aware of what they can or cannot do well and can become overly concerned about perfection.
- Are more interested in realism and often want to achieve perfection portraying realism.

- Develop an understanding of perspective. Images in the distance are smaller. They learn how to overlap forms without revealing concealed parts. The sky and the land are well connected.

- Do not center objects so carefully as before. Different viewing points are considered and explored and lines are less geometric.

- Like to relate proper color choices to images or objects.

- Will make a strong effort to perform an art task the right way. Conforming to rules within the group or class is now important. Team efforts are more valued and enjoyable.

Ten-year-olds:

- Have improved physical hand strength and stamina that enable them to undertake more complex art processes. They understand how to use a wider range of art tools and are aware of safety issues.

- Enjoy planning overall compositions in advance of working out the final idea. Some students do need to continue part-to-part development in their work.

- Are willing to spend the needed time on completing their art work. Pictorial work is usually more detailed and topically related to their immediate experience and special interests.

- Can make color choices that are more subtle and will use qualities of line and texture that often echo characteristics of the students' handwriting.

- Enjoy expanding their imaginations and developing ingenious compositional devices to represent their visual ideas. Third dimensional inventions are particularly interesting and challenging for them.

- Desire approval from their peers. Their artistic standards are more established and they are often quick to judge their own efforts.

- Enjoy group projects that give them a clear and important role in the total artistic effort: murals and model making for example.

- Are developing a personal style of art making or working. They understand how to break down the process and manage their art materials. Cause and effect relationships heighten their interest in creative problem solving and analyzing.

Children may share similar characteristics in their art work, but this does not mean they are working at the same pace or in a similar creative style. Their approach to creativity at this stage is becoming much more individualistic. Some children work at a quick, enthusiastic pace while others work slowly and methodically. Both groups are able to achieve successful closures.

In every classroom, there will be children who do not fit into the normal development stages or categories. These children may have special physical and mental needs and find using some art materials difficult. They may have emotional problems or find it hard to organize visual ideals. There are other children who excel in art yet have difficulty in other academic areas.

Children in this age group often experience a crisis of confidence in creating art. This often occurs when their ideas and concepts exceed their skills in creating visual forms. Helpful advice and identifying the problem or the special need of the students will aid in their personal fulfillment of the artistic task. Inspiration can come from recognizing their own particular interests and helping them identify what they are already knowledgeable about. Also students need encouragement to be patient with themselves. It will make the creative process easier.

There are a number of generally accepted characteristics and attributes that define a creative child.

Intelligence. Children who show high creativity are usually highly intelligent. However, it is important to remember that the reverse may not be true; a high IQ does not guarantee high creativity.

Originality. Creative children display clever responses and uncommon solutions in problem solving.

Awareness. Creative children show a sensitivity for their environment. They often notice things that others do not and they are more open to discoveries.

Flexibility. The creative child is more adaptable and will try different approaches to new problems and situations.

Elaboration. The child is able to take an idea and follow through with more expansive thinking and fluency of ideas.

Persistence. They are highly motivated and self-directed in accomplishing their goals. In their enthusiasm they can forget about time.

Humor. Creative children often have the ability to see more meanings in a situation and can be more playful with materials and ideas.

Risk-taking. Children who are creative often exhibit more independence and personal courage. They have self-confidence in what they can accomplish and understand that their ideas and work have value.

Curiosity. Creative thinkers never stop looking, asking questions or experimenting with ideas.

An Art Program for Eight, Nine and Ten-Year-Olds

Motivation

The teacher's role in setting the tone and atmosphere for creative art experiences is a very important one. Many different aspects have to be considered.

One of the first considerations for a teacher is how the classroom should be set up. It is important that each child has space in which to work. If children are involved in a large construction, space has to be set aside for materials. Materials have to be visible and available for children to use. There are several ways to set up this kind of working environment. One is to place materials at the work space of each child before the activity. Or, place them on one counter or table where children may select them. This solution often works best. At the end of the work period, children return materials such as scissors to the same space. After cleaning up, the materials are ready for use again.

It is always important to stress good safety habits. The class could be encouraged to devise some safety rules and these rules could be posted in the art room.

In teaching art to eight, nine and ten-year-olds, it is important to find a balance between excessive direction and complete freedom to do anything they choose. Finding this balance is an essential part of planning every art lesson. Every successful art process allows for open-ended solutions and individual problem solving. Teachers should have learning goals and objectives in mind. The enthusiasm they bring to the art experience will serve as inspiration for the students.

While the teachers are demonstrating art lessons, it is important that they remind the children that they are learning how to use the tools so that they, in turn, can feel comfortable in implementing their own responses to art. Depending on the art medium, it is necessary for the teacher to use an appropriate art vocabulary to describe the process. The children's vocabulary will grow as they experience the process and use the art tools.

Avoid using patterns or prescribed shapes in planning art lessons. Patterns or outlines create a sameness and uniformity that do not allow children to rely on their own imaginations and artistic skills. When teachers allow students to create their own shapes, teachers show their confidence in the children's artistic abilities. The children need to know that their work is valued.

There are special times when pre-cutting shapes can be helpful. For example, pre-cutting a book cover and interior pages with a paper cutter saves time and makes the assembling process easier for everyone. This time-saving step enables the children to spend more time in writing and illustrating their books. Each book will look different as each child is encouraged to express his or her own story idea.

Eight, nine and ten-year-olds often like to look at and copy pictures or images. Their desire to capture realistic images is important to them. An available picture file or still life arrangements are a great help to them. Teachers and children should be comfortable with this approach. Frequently children in this age group will draw favorite shapes over and over again eventually mastering the image in their own style. It is vital for a teacher to acknowledge this pattern of development. And it is important that the children feel inspired and eager to get underway in the creative process. Creative learning occurs when creative teaching takes place. The sound level in the classroom should be a busy hum of activity as the work process begins.

Talking About Art with Children

Reading stories, looking at art prints and samples, and taking field trips to museums are excellent ways to stimulate children's thinking about art. Involving them in a critical dialogue teaches them the visual as well as the verbal language of art. When adults work with children to find words to express criticism of aesthetic qualities, meanings and behavior, we give them another means of expression and mode of perception.

These guided discussions stimulate greater interest and lead to greater success in children's experiences with an art medium. It is important that after such discussions they can experience the particular art medium for themselves.

For example, a teacher or artisan may discuss ceramic objects with the class, talking about an object's form, its size and "feel" and how it looks. Research has shown that there is a direct link between discussing and creating art. Giving children time to make their own ceramic objects will give them a sense of closure in the art experience. They create with a heightened sense of enthusiasm and interest and they experience greater success when they understand the art materials.

When viewing art prints or art objects, the following discussion strategies may help to develop and enhance aesthetic language in the classroom.

- Encourage the children describe the artwork. List these words on the board as they discuss them.
- If the artwork is figurative, ask each student to pretend he or she is the subject. Have the children explain why they are part of the work. If the work is non-objective, do the same with an element of its design.
- Ask the students to give a name to the work of art. Share this with the class.
- Pretend that the child just purchased the artwork and is called upon to tell about it.
- Tell the children about the artist and what was being expressed in the particular work of art at an appropriate time in the discussion.

Following such discussions, introduce the children to the materials they will need to make their own creations.

Step-by-step demonstrations of an art process are always helpful. Visual learners will profit from observing the process before they start their work. Auditory learners will gain from hearing the process described.

Guidance

When children are actively involved in a creative art experience, problems sometimes arise that require a teacher's guidance. Help and suggestions are best offered on an individual need basis. For example, a child may need assistance in organizing his or her visual ideas. Identifying the steps involved and thinking through the problem will help the child find different solutions and approaches. Working out the idea on a separate piece of paper can be helpful. Teachers should be aware of children who might become frustrated.

Children often do not like their initial efforts and may want to start over again. If this happens, it is best to allow them to do so. Allowing a child to learn from trial and error demonstrates respect for that child as a creative individual. It is more important to support that individuality than to save a piece of paper. Sometimes the reverse side of the rejected effort can be used, or the unwanted section can be cut away.

Positive encouragement and enthusiasm from the teacher are very important. Regardless of whether or not the student is experiencing success, nothing succeeds better than honest praise. When children accomplish their goals and overcome problems, they learn the value of persistence and completing a task.

Teachers should not overextend themselves when taking part in an art process, but adult assistance can be helpful with some art projects. Eight, nine and ten-year-olds especially enjoy construction projects. Often these projects become quite involved and an extra set of hands is welcomed by both the teacher and the children.

Evaluation

Innate talent plays a role in a student's skill and interest in art just as it does in other subject areas. In the early school years, it is not wise to label the "best class artists" or to compare one child's artistic efforts to those of classmates. Children at this age level will identify who is good at art, but it is important that each child's efforts and insights are valued. Comparisons can discourage students who may just enjoy a hands-on process.
Teachers should be familiar with the developmental expectations of the age group in their classroom. Constructive evaluation focuses on the individual children and the effort and energy they have put into completing their work.

Some good questions to ask are:

Did you enjoy making that?
What inspired you to think of that idea?
Are you happy with your work?
Tell me about your picture or construction.

It is also very important that children sign their finished work. The choice of space for the signature can be made by the teacher or chosen by the children. It should, however, be placed on the front of the artwork itself and not on the back. The reason—when children's work is put up on display, the teacher does not have to rewrite the names on the front of the work; moreover, the young artists' signatures have artistic value too!

In this century, educators and adult artists have recognized the artistry to be found in children's art. Many famed artists, including Wassily Kandinsky, Paul Klee, Pablo Picasso, and Joan Miro have been intensely interested in the artwork of children. Not only did they collect such works, but they took inspiration from it (Fineberg, 1995). A recent exhibition in Europe, "The Innocent Eye: Children's Art and the Modern Artist," demonstrated once again the importance of children's art for its own sake.

The fact that a work of art is created by a child does not mean that it has no artistic merit or value. Its value lies in the fact that its creator cares about expressing ideas—using the artistic skills and materials with which he or she is comfortable. The adult artist has a greater command of artistic skills but is basically doing the same thing. All artists are continually learning through creating regardless of age.

Art Portfolios

Children at this age level can understand the importance of keeping their artwork in an art portfolio. Storing drawings and paintings (two-dimensional work) in one place throughout the school year is helpful in organizing the children's work and aids the teacher during conferences with parents. A portfolio is also helpful to children in reviewing their progress with their teacher.

Children should place their names on the edge of the portfolio, using the same location so that the folders can be easily sorted and distributed. The teacher should also make sure that the students sign their names on each piece of their artwork. Works, of course, should be dry before they are placed in the portfolio.

Eight, nine, and ten-year-old children, who are less eager to take their artwork home, appreciate the importance of keeping an art portfolio. They enjoy adding to their collection.

Directions for making an art portfolio are included in the sample lesson section.

Art Displays and Exhibits

Displaying children's art celebrates creativity in a school. It sends a visual message to parents, visitors, friends, and teachers that art is important and valued. Children take great pride in showing their artwork. Colorful displays add to the atmosphere of a classroom, reception area, or hallway. They reflect the learning and pride in the school's art center.

The classroom can have a special corner or place set aside where children independently have access to art materials. Art prints and photographs can be mounted on the walls near the center. During the week, teachers can post on a bulletin board an activity the children can do independently in the art center.

At the beginning of the school year, the teacher describes the standard art materials that are available for the children to use. Several students are assigned each week or month to make sure the art materials are in their proper place.

Labeling storage bins, shelves, and containers is helpful for the adult art helpers as well as for the children. These art materials should be easily accessible. Smocks or aprons should also be available for the children to use in independent and group art activities.

Once the center is established, new art materials can be added throughout the school year. Often parents or friends will have extra materials to share or give to the center. Collecting fabric and wood scraps, yarn, buttons, bottle caps, and cardboard tubes and boxes should be encouraged. Children enjoy working with recycled materials and discovering different ways of using them in their artwork.

Artistic Heritage and Holiday Celebrations

Every country and culture has its own folk art traditions. The words "folk art" are difficult to define. In contrast to "fine art," folk art is less formal by educational standards, often more spiritual. It has a commonality shared by a community or place. It is often a craft skill that has been passed down through generations to the present. Many of these craft traditions are specialized and practiced in particular regions or specific locations. Folk art objects often play a part in a country's holiday festivals.

These craft traditions are part of children's artistic heritage. These traditions should be valued and included in children's cultural and art education. Such craft traditions give a richness and special quality to the appreciation and understanding of various cultures.

Holidays and festivals are special occasions in the life of every school age student. Children look forward to making presents, cards, decorations, and invitations to help celebrate these occasions. Almost every art medium can be used to make gifts and decorations. For example, the sample lessons on books and kites can be adapted to holiday celebrations. When children can personalize their art in making gifts or presents, it reinforces the value of learning to give to others. Art becomes meaningful in yet another way.

Parent Participation

Art experiences allow parents to become active participants in very positive ways. Sometimes there is a child whose parent is a crafts worker or artist. Teachers should find opportunities for that parent to share his or her skills with a class. Children take great pride in sharing their parents' talents. Parents can also help in planning for festivals and celebrations.

Often special art activities require materials that have to be obtained from a variety of sources: wood scraps from a construction site, paper from a printing plant, plastic scraps from a factory, and so on. It is a great help to the teacher when parents collect such materials. Everyone benefits from a collaboration of parents, child, and teacher.

Safe Art Practices

Safety rules are important in art. As children grow older and their small motor skills improve, they will want to use tools that require an awareness of safety. It is important that the teacher explains how and why certain tools are used in a certain way. For example, sharp scissors, compasses, and cutting tools require extra caution.

Some good rules to keep in mind are:

- Use tools with care.
- Put tools and supplies away when they are not in use.

- Keep art materials away from the face the eyes, nose and mouth.
- When paint is spilled, help with the cleanup. Warn classmates and teachers when the floor is wet so no one falls.
- Wash hands after everything is cleaned up.

Planning Art Lessons

When planning an art lesson or program, there are a number of factors that should be taken into consideration:

Space in the classroom where art activities are to take place
Available art materials
Water sources and drying space for art work
Class size: the number of children who will need working space

The purpose and objectives of an art experience should be defined. Integration of art activities with other subject areas gives children a greater understanding of how disciplines relate to each other.

The following are some art units that might be explored.

UNIT ONE: OBSERVING YOUR WORLD

- Drawing Self-portraits: People
- Drawing and Painting: Still Lifes
- Patterns and Lines in Nature
- Warm and Cool Colors: Weather
- Mixing Tints and Shades: Seasons
- Line, Form, and Texture: Animals, Fish, and Birds

- Space and Lines: Transportation
- Lines, Color, and Forms: Landscapes
- Lines, Color, and Forms: Architecture
- Space and Forms: Sculpture

UNIT TWO: ART AROUND US

- Industrial Design: Things People Design
- Graphic Design: Signs and Messages
- Book Art: How Books Are Made
- Architecture: Forms and Different Kinds of Buildings
- Photography: Portraits and Places
- Film: Movies for Theater and Television
- Landscape Architecture: Garden Design
- Interior Design: School Design
- Textile Design: Clothing We Wear

UNIT THREE: DISCOVERING ART IN OTHER LANDS

- Color and Patterns: People in Costumes
- Symbols and Forms: Masks, Flags
- Pattern, Color, and Form: Mosaics
- Modeling Clay Forms: Sculpture

- Pattern and Color: Wall Hangings and Weaving
- Forms, Patterns, and Line: Architecture
- Lines and Space: Transportation

Art Materials

The art lessons that follow, as well as many additional art projects, use the art materials found on this list:

Supplies for Students

Drawing paper (white)	— that will not tear easily
	— painting projects need heavier paper
Colored construction paper	— red, blue, yellow, green, orange, brown, and black
Rulers	
Pencils	— soft drawing pencils
Pens	— drawing pens
Ink	— black and colored
Crayons	— wax (at least eight colors)
Markers	— assorted colors
Paints	— watercolors, tempera (may be in powder form)
Glue	— recipes for glue and clay are included in this section

Clay/play dough — requires a covered container for storage

Scissors — small, some medium-size

Chalk (pastels) — colored

Thumb tacks

Masking tape

Tools for working with clay

Needles — for sewing books

Supplies for Teachers

Paper clips

Rulers — long and short

Scissors with sharp point — good ones for paper and fabric

Hole punch for paper

Staplers and staples

Masking and clear tape

Thumb tacks

Soap for cleanup

Sponges

Rags

Paper cutter — often shared with other teachers

Containers for water

Collectible Materials

Parents can help children gather the following materials from their neighborhoods:

Old newspapers

Tin cans

Styrofoam

Different kinds of paper (cardboard, tissue, newsprint)

Fabric scraps (cotton, wool)

Wood scraps

Buttons

Yarn, string, ribbon

Straws

Clothes pins (for hanging art)

Art prints and postcards, magazine photos

Sticks, twigs

Smocks, aprons for students

Water containers

Teaching Content Areas Through Art

Eight, nine and ten-year-olds enjoy broadening their art activities, particularly building constructions and putting things together. Students who do not always feel successful in drawing can get much satisfaction by putting shapes and forms together in other ways. Many useful techniques and skills are developed in construction projects measurement and math skills, problem solving in fastening various elements together, and becoming familiar with a wider range of materials.

Art is an exciting and creative way to explore content areas in the curriculum. Social studies, literacy, mathematics, and science can be incorporated in hands-on activities. Teachers can create art activities to help illustrate concepts taught in a variety of curricula content areas.

As the children produce and create their art in a particular area of study, teachers can watch for examples of conceptual understanding to assess how the child is learning and what he or she has learned. Information learned is reinterpreted through art when children are given time and materials for exploration.

Ideas that come from the community and throughout the world can be explored and expanded upon through art. The sample lessons that follow can be integrated with many subject areas. Ideas for expansion have been included at the end of each lesson.

Sample Lesson Plan: Making a Portfolio

Objectives

Through this activity, students will:

- Organize two-dimensional (flat) artwork so that it is always kept in the same storage area and is always easy to find.
- Keep a visual record of their progress in art.
- Help the teacher at parent conferences. Portfolios can be used to record a student's artistic progress and development.

Materials

- Large sheets of heavy paper that can be folded in half or cut in appropriate sizes and held together by a wide tape. A good size is 45 cm x 60 cm.
- Tape—wide if possible
- Ribbon or string for tying portfolio together
- Markers

Procedure

1) Cut the heavy paper (cardboard) to the desired size. It is important to take into account the size of the shelf where these portfolios will be stored. Think about how many portfolios must be stored and how large the largest drawings will be.

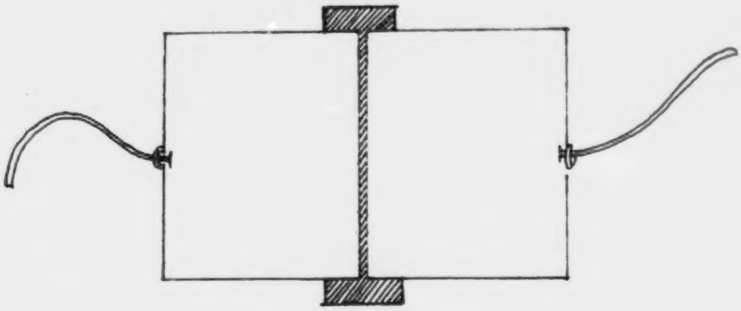
2) Measure carefully to find the center if you are folding a single large sheet of heavy paper. Sometimes it is better to score one side of a large cardboard with a mat knife (sharp cutting blade) to gently cut a line not cutting entirely through the paper. This makes folding the heavy paper or cardboard easier and gives a neater appearance.

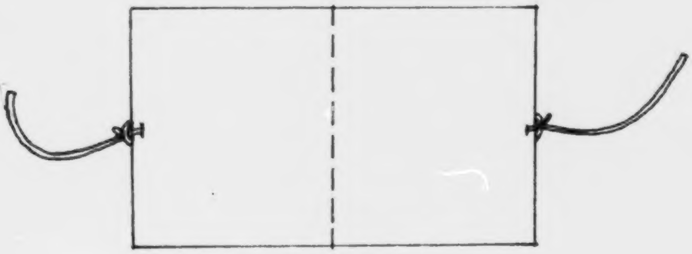
3) Lay the two separate sheets face down on a flat surface and leave a space between the two sheets. This is will serve as the spine of the portfolio.

4) Place tape down over this line where the two sheets meet, leaving some tape at the top and bottom to fold over the edges. You may want to cover the inside spine with tape also.

5) Attach a strong or ribbon on the sides to hold the artwork in place inside the portfolio.

6) Arrange for the name of the student to be visible and easy to find. The student should follow specific directions and write his or her name at the designated spot along the open front side or across the top of the portfolio.





Assessment

Some questions that would help assess this activity:

Did the students observe their progress in art this year? Did their artistic skills improve?

What art activity was the most rewarding?

Do portfolios help in classroom and personal organization?

Additional Activities

- The portfolios can be decorated with a design if time allows.
- Propose a design activity. For example:

  Trace hands with dark markers and color in patterns using bright colors.

  Ask students to draw theirs in a variety of fantasy fun shapes.

  Glue a photograph of the student on one side and draw a frame around the edge of the photo.

Sample Lesson Plan: Letter and Name Art

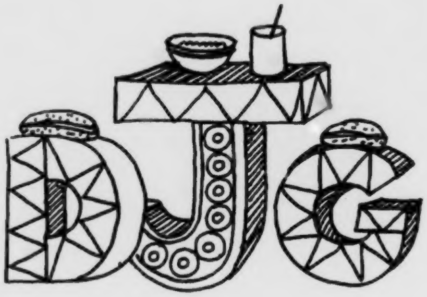
Objectives

Through this activity, students will:

- Think about graphic design and observe how they can create visually expressive lettering.
- Develop drawing dexterity using pens and markers.
- Learn that some artists design unusual alphabets.

Materials

- Drawing paper and practice paper
- Pencils (with erasers)
- Black ink, pens and markers
- Rulers



Procedure

1) Show students examples of lettering or graphic art done by artists who have used letters in unusual ways. Alphabet books are a wonderful resource.

2) Have the children start by using initials of their last or first names. Let them practice in pencil on scratch paper. They may use print or the cursive form. Children love to write or print their names in unusual ways.

3) Let students go over the lines in black pen and markers after they have made their outlines in pencil. Encourage them to add imaginative details. Also remind them that the letter should still be recognizable or visible.

Assessment

- Ask students to gather in conversational groups or in one big group to discuss their "graphic art." What did they learn and observe about lettering?
- Discuss how can they use these lettering ideas again.

Additional Activities

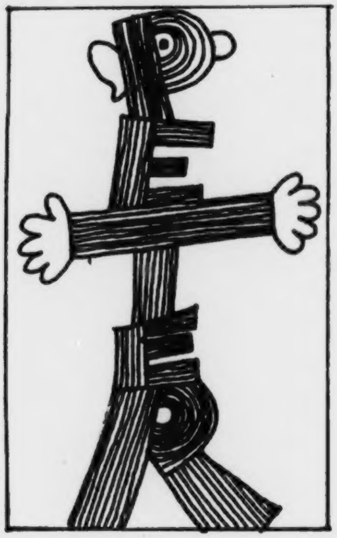
- The students can use letter design to make greeting cards.
- They can use letter design to make their own books.
- They can use letter design to make signs for display around the school.
- For language arts: assign one letter of the alphabet to each student. Each then creates an interesting letter form. The forms can then be combined to create an interesting alphabet.

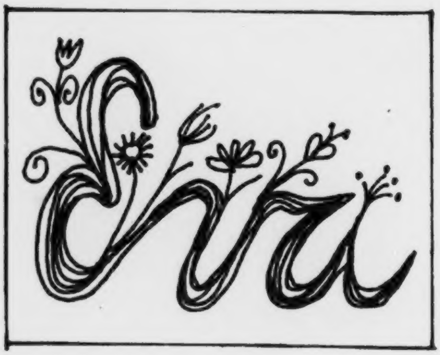
Time

45 minutes, if more completion time is needed.

Resources

Graphics from magazines and newspapers.





Sample Lesson Plan: Drawing a Portrait

Objectives

Through this art activity, students will:

- Observe "our" faces, the faces of our classmates and friends. Encourage students to think about what is the same about their faces (two ears, two eyes, one nose and one mouth). What is different about each face? Skin and hair color, for example. Are there ever two faces that look alike?

- Understand that in attempting to draw one's own face or portrait, a student will not produce a perfect likeness. Knowing this will make it easier and less stressful for the student to attempt a self-portrait. Students should be encouraged to focus on their own particular facial characteristics.

Materials

- Drawing paper (30 x 46 cm is a good size)

- Pencils, erasers

- Small mirrors, if possible

- If color is desired, use markers or colored pencils

Procedure

1) Make sure the students have a mirror (or mirrors) to examine their faces.

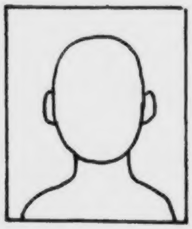
2) Caution them to relax and to draw "lightly" when they start to draw.

3) Let students try the following "guided discovery" sequence:

   a. Draw an oval-shaped head in the center of the paper.

   b. Next, draw in the neck. This is two parallel lines a tube shape.

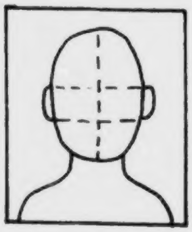
   c. Draw the top part of the body or the shoulder line.



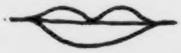
   d. Gently draw a line down the center of the head.

   e. Next, draw a light line from the top of one ear to the top of the other ear. This will be the eyebrow line.

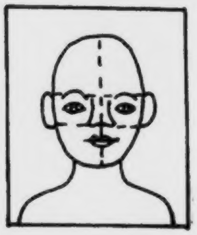
   f. Draw a "bottom of the nose" line. It should match up with the bottom line of the ear.



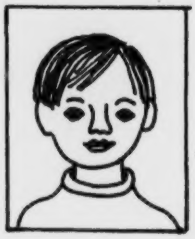
   g. Draw a mouth line halfway between the nose line and the bottom of the head shape (chin line).



4) The students are now ready to draw in features. Draw eyebrows and beneath them the eyes (discuss eye shapes and pupils of eyes). Draw in a nose shape. Above the mouth line, first draw an upper lip line and below the lower lip line. Next, draw the hair. If the ears show, draw them in.



5) Remind students to draw slowly and draw the details "you see in your face."



6) When the children are happy and confident about their drawings, have them darken their line work. As confidence grows in drawing faces, they will discover their own drawing styles.

Additional Activities

Students can be encouraged to draw themselves in costumes. They can also do a painting of themselves. Thinking about skin colors will give them an appreciation and greater understanding of diversity.

Some questions that would help assess this activity:

> Are you happy with your portrait? What facial feature did you find the hardest to draw?
>
> Will you be more aware of portrait painting and drawing now?
>
> Would you like to sit and have your portrait drawn by another artist now?

Time

45 minutes; extend if colors are added.

Sample Lesson Plan: Still Life Painting

Objectives

Through this art activity, students will:

- Observe and learn to draw from an actual still life arrangement.
- Think about what the words *still life* mean: arrangements of inanimate objects that are used for the purpose of drawing.
- Observe prints of still life paintings and drawings done both by your country's artists as well as world famous artists such as Henri Matisse and Pablo Picasso.
- Learn how one-point perspective is used to create a still life. Note: the nine-year-old student will be more challenged to overlap shapes. Thinking about sizes of objects will be easier for the nine-year old. The eight-year-old student will be interested in spacing and patterns and often comes up with some surprising color choices.

Materials

- Drawing paper, size determined by the teacher taking into account the age of the students and the class time for the activity.
- Pencils
- Markers or paints (tempera)
- Pastel chalks
- Smocks, water containers and brushes will be needed if the students are painting. Note: different brush sizes are nice to use small brushes for small spaces and large brushes for large spaces.

Procedure

1) The teacher creates a still life arrangement for the children to draw at the front of the classroom—three or four objects for eight-year-olds and perhaps five objects for nine-year-olds. Placing the objects on a patterned cloth often helps students better visualize colors. Also, match the size of the paper to the vertical or horizontal arrangement of the still life.

2) Use simple instructions. Start from a central point in the arrangement. Talk about where to locate an object on the paper and how big it should be.

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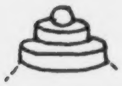

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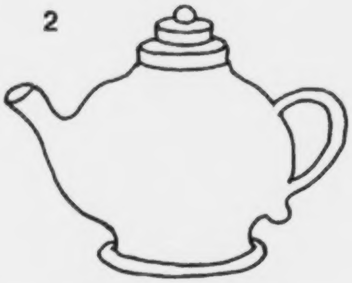

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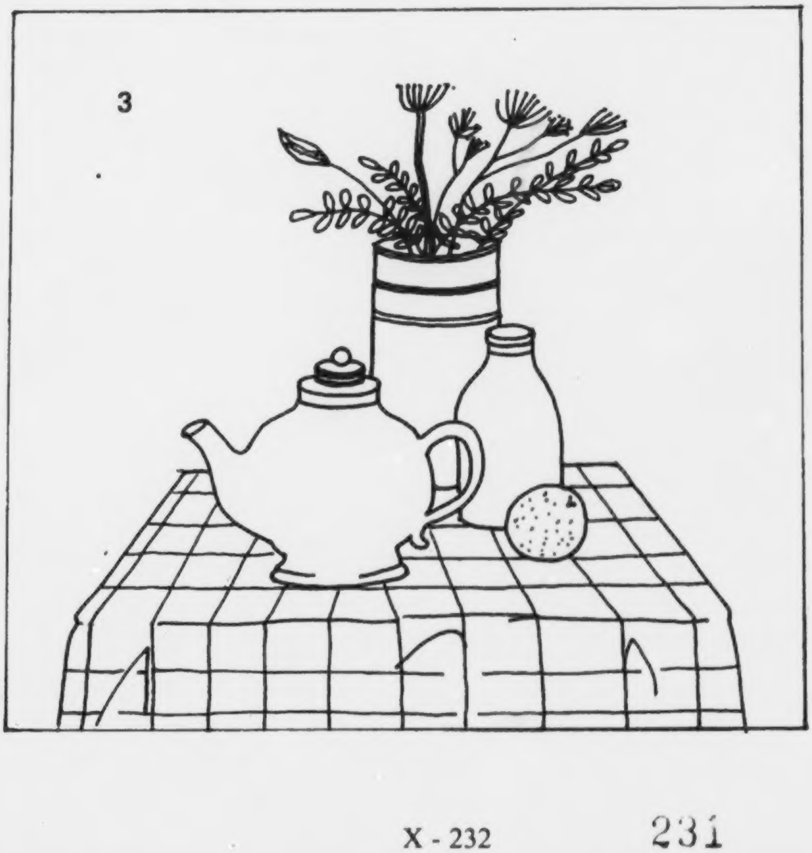


Assessment

Some thoughts and questions that would help in assessing the success of this activity are:

- Did the children become involved in their drawing?
- Did they discover how arrangements can be made to look three dimensional?
- Did their spatial thinking expand in new directions?
- Did they learn more about using colors in their artwork?

Additional Activities

Other still life drawings or paintings can be based on:

- Kitchen utensils
- Flower arrangements
- Hats or shoes
- Toys—stuffed toys, dolls, cars, trucks, buses
- Foods—fruits and vegetables
- Still life collage. Children enjoy cutting shapes and making a still life arrangement on a patterned background.

Time

Two 45-minute periods

Resources

Prints of still lifes done by famous artists.

Sample Lesson Plan: Clay Tiles

Objectives

Through this art activity, students will:

- Learn how to make clay coils to create a tile
- Learn how to control small hand movements to achieve desired results
- Learn how to create a useful and decorative tile by using a picture or design idea

Materials

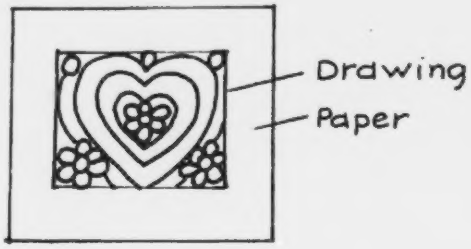
- Moist terra cotta clay. Each child will need two full handfuls
- Ruler
- Pencil
- Surface on which to roll clay. Polished or varnished surfaces do not work because clay sticks. Old canvas cloth and unpolished wood squares work well.
- White paper
- Small sticks, toothpicks, plastic forks or knives
- Pastry dough roller
- Water container for use in moistening clay that is getting too hard. Children should only use their fingers to dampen clay. The clay itself should not be immersed in the water.

Procedure

1) Draw a square (18 cm) or a circle (18 cm radius) on the white paper, using a pencil.

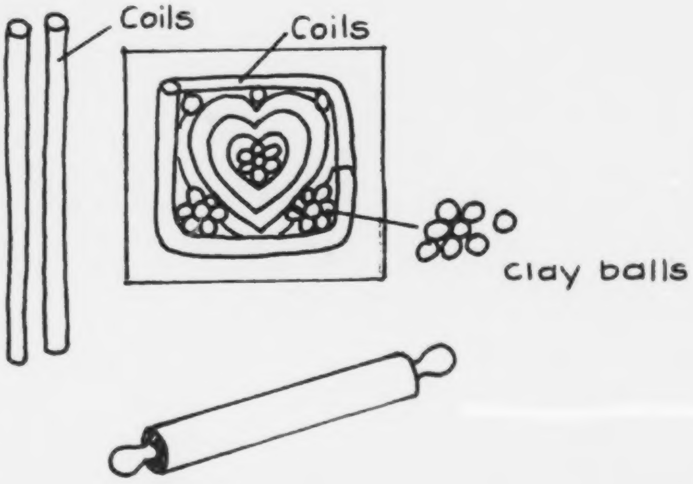
2) Draw a picture or design within this shape. Do not make the design too detailed. Keep it simple.

3) Start to roll long coils of clay. Stress the importance of keeping the coils even, not lumpy. Also, the students do not have to make a "long, long snake" of a coil. The coils should be kept to a manageable length so they can be transferred over to the square or circle.



4) Have the students make some small clay balls.

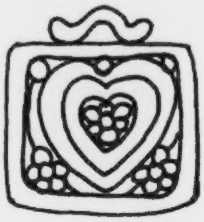
5) Begin to place the coils around the edge of the square or circle. Make sure ends connect with the beginning of the new coil. Just press them together with your fingers. Fill in the design with the coils by following the outline of the last coil. When the design is completed, fill in small background spaces with the clay balls.



6) Place a piece of paper over your tiles when you have completed them. Gently roll a pastry dough roller across the surface. Do not press down too hard because you do not want the tiles to become too thin.

7) Remove the paper from both the top and bottom of the tiles and allow them to dry flat for a week. Sometimes flat clay pieces tend to warp or turn up in places. There are two ways to prevent this from happening. Do not dry them in a sunny area; in addition, place a damp piece of cloth over the top of the tiles while drying. Warping occurs when tiles dry too quickly. After about a week, the tiles are ready to be fired in the kiln.

8) Attach a coil to the top or punch two holes through the tile for a string hanger if the tile is to be hung on the wall.



Finished tile

9) Glazes may be painted on the pieces after the first firing in the kiln. If glazes are applied, re-fire. The children can also paint the tiles.

10) After the clay tile is lifted from the paper, an imprint of the tile design will be left on it. Students may want to do something with this clay print.

Assessment

Some questions for the children that would help assess this activity:

Did you develop an awareness for how tiles can be used to decorate interiors or be used for useful purposes?

Working in clay requires different artistic stills and craftsmanship. What new techniques did you learn working in this art medium?

Additional Activities

- Have the children make these tiles for special occassions.
- The tile lesson can be used as a group project and become a permanent part of a school's decoration.

Time

One hour

Sample Lesson Plan: Making a Book

Objectives

Through this art activity, students will:

- Discover how books combine two art forms: the visual arts and the literary arts.
- Learn about a basic bookmaking method using the booklet stitch.
- Learn how to sequence visual ideas to tell a picture story.

Materials

White paper—cut for a double page size, 3, 4 or 5 sheets per book (making 6-10 pages when folded)

Paper cutter—to cut double pages

Scissors—to cut thread

Pencil—for marking

Ruler

Needle—sharp point

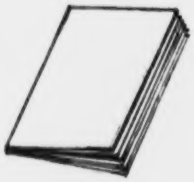
Strong linen thread

Glue and a brush to use for applying glue

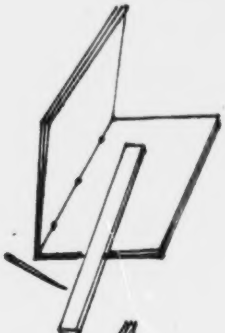
Colored pencils for illustrations (do not use markers as they often bleed through paper)

Procedure

1) Cut paper for pages. Use a paper cutter if one is available. Fold these pieces of paper in the middle and then put them inside each other to form a book shape.

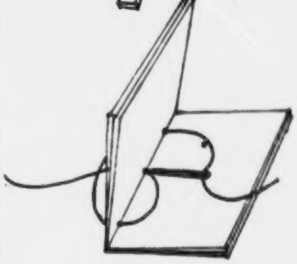


2) Cut another piece of paper the same size as the paper being used for the pages. This paper may be of another color. Fold it down the middle, the same way as the book pages. Place the book-shaped pages inside this folded paper.

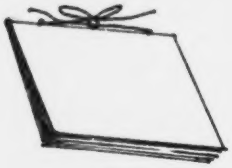


3) Use a pencil to mark the inside of the folded pages where the stitching needle will go. Use a ruler to measure these marks (note illustration).

4) Use a needle to punch three holes. Make sure these holes go through the middle (spine) of each page.



5) Push the needle and thread through the middle mark/hole, starting from the outside. Then push the needle from the inside through one of the holes to outside. Make sure you are going through the pages and the outside colored paper cover.



6) From the center hole move to the other hole on the opposite side. From inside the book push the needle through to the outside, using the middle hole.

7) Tie these two strong ends together in a double bow. Trim with scissors.

There are two methods that can be used to finish the book.

One method:

- Cut two pieces of cardboard or stronger paper to a size about 2 cm wider (on all sides) than your book.

- You can layer these hard cover pieces with paper or cloth if you wish. Note illustration. Brush glue on one side of the cardboard and then place down on the cloth or paper.

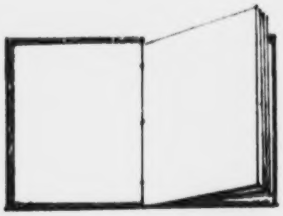
- Now brush glue down on the corners. Fold the corners down (see illustration) and then fold all the edges inwards.

- The colored paper can now be folded back from the white paper to become the end paper of the book. Glue these end papers to the backside of each cover.

- You now have a hard cover book. If you make a book using this method, you may not want to cut the booklet tie too closely. A tie can enhance the look of the book.

Another method:

- Follow the same procedure in cutting stronger book covers, but glue the covers together on the same paper or cloth covering. You must leave a space in the middle for folding.



- Glue down corners, then the edges. Then glue down the end pages. This book form hides the booklet stitch so that the resulting book looks more traditional.

Note: When parents help with this project it is much easier for the teacher and students. The extra hands will also speed up the process and make the gluing less difficult for the students. In the next step, the teacher and students plan the story writing and illustrations for their books.

Special Note

It is important that this two-part artistic process is not rushed. The process involves both artistic skills and skills in the language arts. It is also a project that works better towards the end of a school year. The students and the teacher pick their favorite story or poems. If the teachers want the story to be handwritten, they can help the children by making light lines on the pages. Space should be left for illustrations.

Assessment

Some questions that would help assess this activity:

Did this process of making a book help in understanding a sequential idea?

When you look at illustrated books now will you be more aware of how the story line and illustrations are related?

Did you enjoy the process? How are you inspired to illustrate and write more stories?

Time

Allow about a month for the whole process.

Resources

A variety of illustrated books.

Sample Lesson Plan: Triaramas — A 3-D Paper Construction

Objectives

Through this art activity, students will:

- Learn to cut, fold, and construct a paper base and background for a three-dimensional environment.
- Learn and improve paper cutting skills and construction techniques.
- Think about how to use form in a spatial and sculptural manner.

Materials

- Construction (colored) paper. Cut into squares 25 or 30 cm is good for this age group
- Glue
- Old newspapers to cover work tables
- Scissors
- Pencils to draw shapes
- Scraps of paper, found materials from the outdoors such as nuts, small twigs, string

Time

One hour

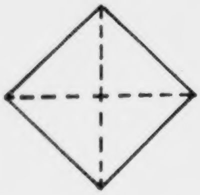
Resources

Prints of sculptures.

Procedure

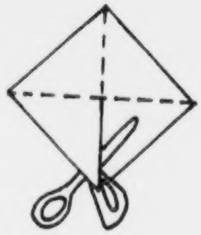
1) Cut construction paper into squares. Do not use very thin paper. Paper constructions must be sturdy. Otherwise they may collapse.

2) Fold the paper squares diagonally corner to opposite corner. Do this twice.



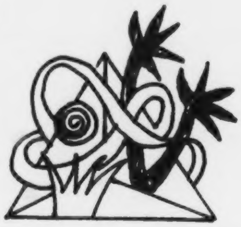
3) Cut along one folded line to center point.

4) Pull the two triangles together and glue them to create a standing base for the construction.



5) The environment can be determined by various subject matter, a favorite book, a science theme, a holiday celebration.

6) To make shapes stand up, first draw them, adding a rectangle at the base. When a shape is cut out, the rectangle is folded under and glued down.



Assessment

Some questions that would help assess this activity:

Does this construction activity give you ideas for another art project?

Did you discover the importance of considering the weights and sizes of objects?

Do you like making a 3-D construction better than a conventional flat drawing?

Additional Activities

The class may decide in follow-up discussions that they can use these ideas in other ways. These triaramas usually make great displays around the school. If there are shelves in the front entrance, 3-D constructions add to the inviting creative atmosphere of the school.

Sample Lesson Plan: Making a Chair

Objectives

Through this art activity, students will:

- Learn about and observe different kinds of chairs and their use.
- Learn how to use recycled materials to create art forms.
- Discover new ways to use their imaginations.

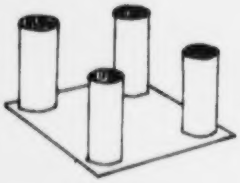
Materials

- Paper tubes — paper towel tubes, toilet paper tubes (short ones for chair legs)
- Strong cardboard cut in 18 cm squares
- Glue
- Sharp mat knife (for teacher use only)
- Scissors
- Paint — tempura
- Various-sized brushes
- Pencils
- Beads, glitter, ribbon, small wooden pieces to glue
- Newspapers to cover work spaces

Procedure

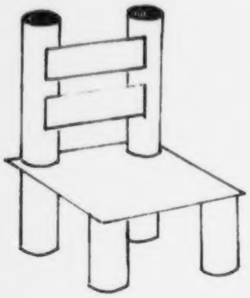
1) Discuss chair design with students. If possible, show them some pictures of different kinds of chairs. Then let them know that they can invent their own chair designs.

2) Cover work spaces with newsprint (old newspapers).



3) Give each student two long tubes for back of chair, four short tubes for legs and one piece of cardboard (18 cm x 18 cm) for seat.

4) Lay square cardboard for seat on newspaper. Apply glue in each corner and place tubes down on glue, one tube in each corner.

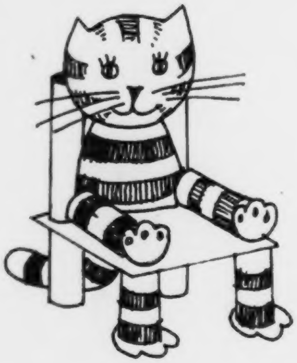


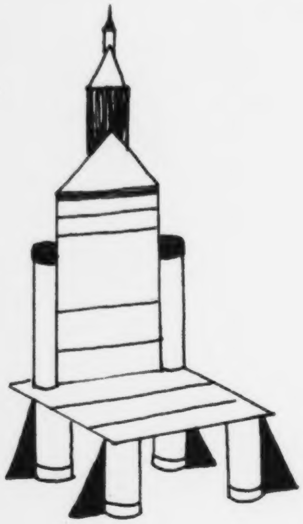
5) When glue appears dry (10 minutes or more), turn over the cardboard stool. Add the two longer tubes on top to form the back of the chair. Glue down the same way and allow glue to dry.

6) Add other cardboard shapes for the back of the chair, arm rests.

7) Paint the chair when it looks finished. If the student paints the base first, it is easier to handle later when the top part is painted.

8) Decorate with yarn, beads, glitter, etc.





This construction activity is a wonderful opportunity for students to use their imaginations. Many children may have thought about a fun chair, but never really had a chance to be more fantastical or imaginative. The resulting works are often amazing and wonderful to observe.

Assessment

Some questions that would help assess this activity:

Did you enjoy the opportunity to invent or design a new chair idea?

Will you think more about chairs that you sit in now? Are they fun to look at? Are they comfortable?

Did this construction activity make you think more about furniture design?

Additional Activities

- These sculptural constructions are wonderful to display.
- Children may be inspired to even create cardboard tables, adding dishes, etc.

Time

Three 45-minute periods.

Sample Lesson Plan: Wind Sock Kite

Objectives

Through this art activity, students will:

- Learn about the history of kites.
- Discover and use materials to make a kite.
- Learn that there are many kinds of kites.

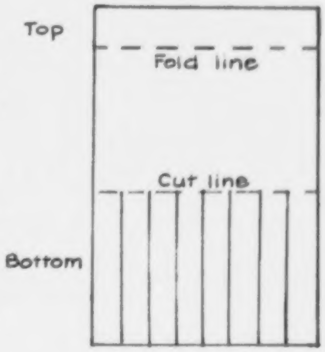
Materials

- Paper—Wide light weight colored paper. Paper scraps and wrapping paper can be used.
- Strong string
- Scissors
- Glue
- Paper punch
- Ruler

Procedure

Children will need considerable space for this activity so it might be helpful to spread out materials on the floor to work. These kites are easy to make. Step-by-step directions for the whole class to follow at the same time will make it easier for children to construct the kites.

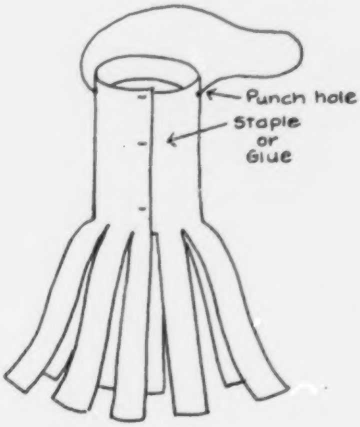
1) Cut paper—wide paper, 60 cm x 75 cm.



2) Fold top edge down about 5 cm. This gives the top of the kite a stronger support for the string.

3) Mark off a line — up to which the children will cut. Leave space at the top for a face or decoration.

4) Ask students to cut long lines up to the marked "cut" line. Encourage them to try spacing around 5 cm. between their cutting lines. They are creating a fringe that will fly out in the breeze.

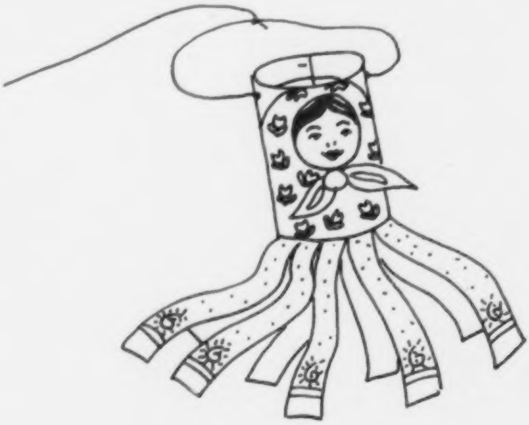


5) Fold the kite to form a cylinder. Glue or staple it together from the top down to the "cut" line.

6) Punch holes in opposite sides to hold the string.

7) Attach a string to the center of the "holding" string. This string, wrapped around a short wooden stick, will be unwound gradually to hold the kite aloft.

8) Let students decorate their kites now, for example with faces of animals or people or with designs for a special festival or school day.



Assessment

Some questions that would help assess this activity:

> If you made another wind sock kite, would you use fabric to make it more weatherproof?
>
> What string attachments work the best or how would you invent a bettter flying line for your kite?
>
> Do you want to experiment with other kite constructions now?

Additional Activities

- Combine kite making with a science lesson on wind.
- Make these kites in light cloth. The top of the kite must be wired to keep the round form from unraveling.

These kites, if done in different colored paper, can make a very lively display when hung from hall or classroom ceilings.

Time

45 minutes; extend if more decoration time is needed.

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XI. MATHEMATICS

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The mind is not a vessel to be filled, but it is a fire to be kindled.
Plutarch

Overview

In order to prepare our students to meet the demands of an ever-changing world, it is essential that they learn to reason clearly and communicate effectively. Fundamental skills and understanding of mathematical applications will help individuals apply their knowledge to new situations. Good problem solving skills will become increasingly more important. By *doing* mathematics, children will discover new ways of thinking and reasoning that can further their mathematical literacy and build self-confidence. Computational skills will be developed along with other essential math skills such as: problem solving, data gathering, assessment of data, measurement, and geometry.

A math program that is consistent with the philosophy of the Step by Step Primary Program will:

- Use a developmental approach.
- Provide manipulatives and concrete materials.
- Individualize instruction.
- Set up small group activities.
- Encourage cooperative work.
- Involve families in the class and keep them informed as working partners.

As we focus on the needs of eight, nine, and ten-year-olds, functional math becomes important. The children have a heightened awareness of numbers in their world and an excitement at making discoveries about number patterns and new procedures. These students are refining their skills and developing new competencies. The teacher's role becomes critical in providing a classroom environment which encourages risk-taking, discussion of mathematical ideas, and testing of solutions. The more math is linked to everyday life, the more our students will realize the need for math in their world.

How Children Learn Mathematics

The Step by Step Primary Program believes that children learn by exploring, guessing, observing, and testing. They are presented with experiences in order to understand a mathematical idea. Therefore, the emphasis is on reasoning and conceptual understanding and not exclusively on accuracy of speed and computation.

Children need to learn mathematical concepts and see relationships among these concepts. Mathematical concepts and relationships are constructed by individuals and exist only in their minds. In order to learn mathematics, children must then construct concepts and relationships in their own minds. Children are provided with direct and concrete interaction with mathematical ideas; ideas are not accessible solely from abstractions. Continuous interaction between a child's mind and concrete experiences with mathematics in the real world is necessary. (Marylin Burns, About Teaching Mathematics, 1992, p. 24)

As their thinking skills develop, the eight, nine, and ten-year-olds have increased ability to do math without manipulatives. They become able to infer, predict, and estimate. Teachers must allow time to focus on the thinking processes of their students. Children experience opportunities to communicate their mathematical understandings in a variety

of ways: by constructing concrete models, by drawing pictures or diagrams, by speaking or writing in their everyday language or in the words of mathematical terminology, and by using mathematical symbols.

In order to become successful problem solvers, students must develop the following characteristics:

- Interest in finding solutions to problems
- Confidence to try various strategies
- Willingness to risk being wrong at times
- Ability to accept frustrations that come from not knowing
- Perseverance when solutions are not immediate
- Understanding of the difference between not knowing the answer and not having found it yet

(Marylin Burns, About Teaching Mathematics, 1992, p.29)

Role of the Teacher

Children need opportunities to explore materials through free play, to participate in lessons directed by teachers, and to work independently and collaboratively on guided lessons introduced by the teachers. Directed lessons occur with the children in a large or small group or individually on a specific skill, strategy, or concept. Explicit teaching helps children make connections that at the time they would not be able to make on their own. Guided lessons are instances when children practice the content of directed lessons with a teacher. *Demonstration* and *participation* take place during directed lessons; practice/role-play occur during free and guided exploration. *Performance* takes place when the children show the teacher what they are learning. Three organizational structures which support math instruction are: math groups, whole class lessons, and special ongoing math activities. (Fisher, 1995, p. 190-191).

An important role for teachers is that of leading discussions:

- Ask questions to which there is more than one acceptable answer.
- Provide a wait time of several minutes before accepting answers to allow slower thinkers an equal chance to answer.
- Help children become better communicators of their mathematical ideas.
- Push them to recognize and explain their thinking. All children benefit from the opportunity to hear each other's solutions.

Sample questions to encourage participation in discussions include:

"What made you think of that?"

"How did you work it out?" or "Can you show us?"

"Did anyone do it a different way?"

"Do you agree?" or "What do you think, Maria?"

"Is this like something else you have seen or done before?"

Teachers plan guided lessons that are interesting to the children and that span the full range of mathematical processes (including measurement, geometry, statistics, and probability). Children should have the opportunity to explore, compare, measure or construct a variety of objects.

Teachers also pose problems without suggesting any specific techniques for solving them. For example, "How can we discover how much juice our class drinks in one week of school?" Children may work collaboratively as they seek solutions to given problems.

Teachers should promote confidence, flexibility, curiosity, and inventiveness in doing mathematics by presenting appropriate tasks and by engaging in mathematical discourse. These goals are accomplished by providing practical activities using materials that stimulate children's interest. For example: ask students to use a balance scale to compare the weights of pebbles and sand.

As facilitator of mathematical learning, teachers will:

- Provide opportunities to solve problems in meaningful situations
- Lead discussions
- Help children become better communicators of their mathematical observations and ideas
- Observe children during explorations and investigations
- Listen to their talk
- Integrate math into other areas of the curriculum (for example, the concept of measurement can be linked with social studies, geography, art, music, science)

Parent Involvement

Parents are in a unique position to help their children understand that math is an important part of everyday life. Children should see the adults in their world doing mathematics. Parents can point out different ways numbers are used and engage their children in conversations which include mathematical terms and concepts. Parents help when they listen to their children's ideas, encourage their children to explain their thinking, and ask questions rather than tell answers. Thus, parents can play a vital role in the development of communication and reasoning skills.

Parents can share with children how mathematics is part of their daily lives by:

- Planning and preparing meals together
- Measuring and dividing things
- Paying for food and calculating change
- Estimating time and distance when traveling
- Using calculators
- Finding geometric patterns in nature
- Recording growth or changes
- Making charts and graphs
- Scoring points during a game

Students at this age begin to have homework. Assignments will be given to provide practice with the skills and concepts being taught in class. The children should be able to complete the assignments with some degree of independence and confidence about what is being asked of them. Homework also helps parents feel more connected to what their children are learning in school. Mathematics activities might include problems which can be explored and solved together with other family members. Suggestions for simple games that reinforce addition, subtraction, and multiplication facts can be sent home as well. Homework can be both fun and worthwhile as it offers another opportunity to help link mathematics with the real world.

Content of the Program

Instructional objectives for the Step by Step Primary Program in mathematics contain six content strands: Developing Number Sense, Operations, Classification & Patterns, Statistics & Probability, Measurement, and Geometry & Spatial Sense.

A description of each of the strands and a statement of its role in a mathematics curriculum precedes the instructional objectives within the strand; they are excerpted from the *Curriculum and Evaluation Standards for School Mathematics* [National Council of Teachers of Mathematics (NCTM), 1989] and *About Teaching Mathematics, A K-8 Resource* (Burns, 1992).

Developing Number Sense

Numbers are used to describe quantities, to compare quantities, to identify specific objects in collections, and to measure. Children must be able to make sense of the various ways numbers are used. They need to develop a sense of numbers that enables them to recognize relationships between quantities; to use the operations of addition, subtraction, multiplication, and division to obtain numerical information; to understand how the operations are related to one another; to be able to approximate and estimate when appropriate; and to be able to apply their understandings to problem situations.

Children's mathematical learning at the primary level has three goals: 1) to emphasize the development of number sense, 2) to help them see relationships among numbers, and 3) to encourage them to examine the properties of numbers. Children should investigate the use of numbers in many situations so that they develop the confidence and flexibility to apply their understanding in new situations. (Burns, 1992, p.125)

Objectives

1. Estimation

   - Guess how many items (buttons, dry beans, cubes) are in a container (clear jar or plastic bag).
   - Estimate quantities up to 100.
   - Recognize reasonable guesses.

- Revise initial estimates as more information is known. (Let children revise their estimate after a portion of the objects have been counted.)

- Round off numbers to the nearest 10 or nearest 100 to compute approximate answers.

2. Counting

- Count by 1's, 2's, 3's, 5's, and 10's.

- Count up, count back, and skip count.

- Make and count tallies.

- Recognize, name, and write numbers up to three digits.

3. Place value

- Put a collection of objects into groups of tens and ones before counting the total amount.

- Identify the number of tens and ones in a given number using base-ten blocks or bundles of 10 straws and loose straws.

- Regroup numbers to 99 (36 = 3 tens and 6 ones or 2 tens and 16 ones).

- Use concrete objects (colored chips or cubes) to represent different values with a variety of bases (Base 3, 4, 5 etc.). Example: Chip Trading.

4. Comparing

- Identify numbers as greater than, less than or equal to one another.

- Arrange numbers in sequence.

- Understand the relative size of numbers (12 is two more than 10; 20 is twice 10; 37 is a lot more than 15; 50 is half way to 100).

5. Uses of Numbers

- Recognize different ways numbers are used in real life.
- Respond to: What is 12? It is a dozen eggs; 12 months in a year; December is the twelfth month; my birthday is Oct. 12; in 4 years I will be 12 years old; 12 girls in our class; 10+2, 8+4, 20-8, 3x4.
- Answer questions such as, When might you use the number 30? I might use the number when I am telling time; measuring weight or distance; pricing an item.

Whole Number Operations

Children with good operation sense are able to apply operations meaningfully and with flexibility. One essential component of understanding an operation is recognizing conditions in real-world situations that indicate when the operation would be useful. Other components include building an awareness of models, the properties of an operation, seeing relationships among operations, and acquiring insight into the effects of an operation on a pair of numbers. Furthermore, operation sense provides a framework for the conceptual development of mental and written computational procedures. (NCTM, 1989, p. 41)

Well-rounded instruction in arithmetic should be organized so that it:

- Introduces arithmetic concepts to students in real-world contexts.
- Develops number sense and understanding of relationships between the operations.
- Integrates arithmetic with the other strands of the mathematics curriculum.
- Builds on children's own ways of thinking and language for describing their thinking.
- Relies heavily on estimating and mental computation.
- Encourages children to invent their own ways to do arithmetic calculation.

(Marylin Burns, 1992, p.159-160)

Objectives

1. Tell, act out, write or draw stories that illustrate adding, separating, and comparing sets of numbers.
2. Add, subtract, and compare one and two-digit numbers in problem-solving activities.

For example: Count the objects in container A and B.

How many objects are there all together?

How many more are in Container B?

or

We want to have 60 cups for the party.

We have 23 cups now.

How many more cups do we need?

3. Discuss and develop different strategies for mental computation and estimation.

   For example: How might you solve 36 + 48?

   Student A. "30 plus 40 is 70; 6 plus 8 is 14; 70 plus 10 is 80 plus 4 is 84."

   Student B. "40 plus 48 is 88, minus four is 84."

   Student C. "36 plus 50 is 86, minus 2 is 84."

   Student D. "40 plus 50 is 90, minus 4, minus 2 is 84."

4. Recall of addition facts (sums to 18) and related subtraction facts.

5. Explore the related properties of addition and multiplication

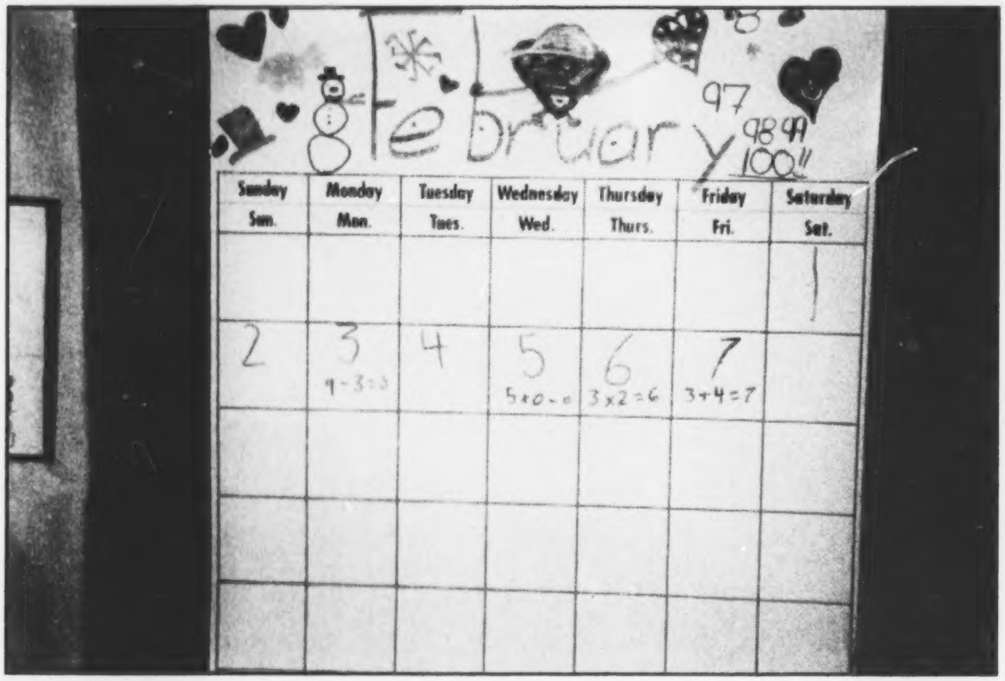
   $8 + 4 = 12$ $\qquad$ $4 \times 5 = 4$ fives $= 5 + 5 + 5 + 5 = 20$

   $4 + 8 = 12$ $\qquad$ $5 \times 4 = 5$ fours $= 4 + 4 + 4 + 4 + 4 = 20$

6. Make models of multiplication and division using arrays.

   For example: 8 x 4 = ◆◆◆◆◆◆◆◆
   ◆◆◆◆◆◆◆◆
   ◆◆◆◆◆◆◆◆
   ◆◆◆◆◆◆◆◆

7. Read and write equations as the symbolic representation of a number story or problem.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5+0=5
3x2=6
3+4=7

Understanding Classification and Patterns

Patterns are everywhere. Children who are encouraged to look for patterns and to express them mathematically begin to understand how mathematics applies to the world in which they live. Identifying and working with a wide variety of patterns help children develop the ability to classify and organize information. Relating patterns in numbers, geometry, and measurement helps them understand connections among mathematical topics. Such connections foster the kind of mathematical thinking that serves as a foundation for the more abstract ideas studied in later grades. (NCTM, 1989, p. 60)

Objectives

1. Describe similarities and differences.

2. Sort by one, two and three attributes.

   For Example: Sort a collection of objects (used postage stamps, buttons, game pieces, stones or shells) and explain categories used ("I sorted by color, shape, size, and texture").

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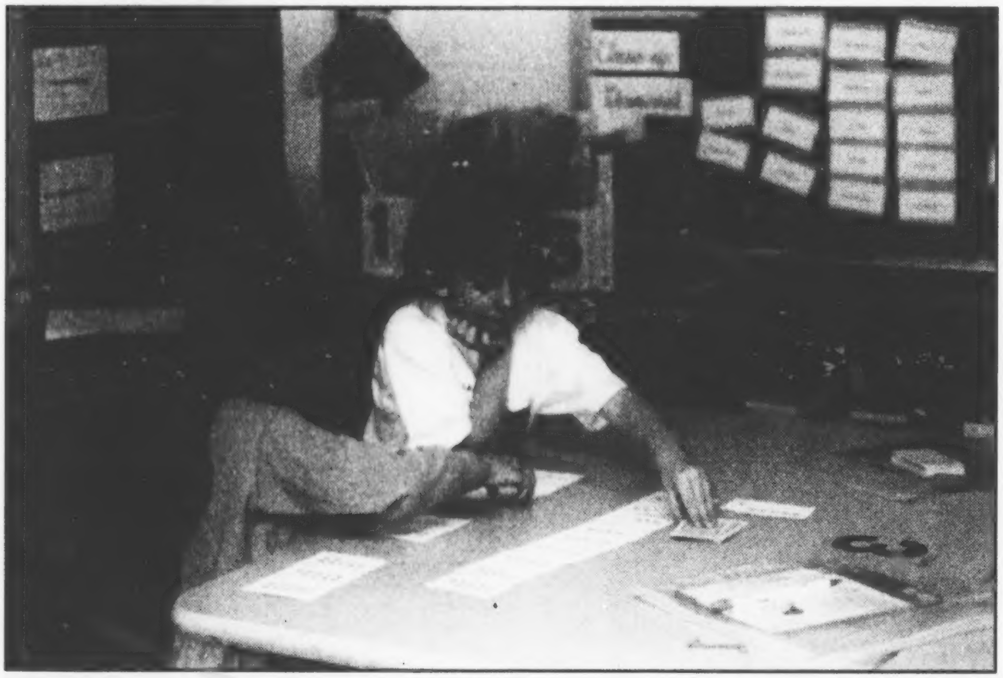
For Example: Sort a large collection of old buttons by dividing into two sub-groups and continue dividing each sub-group into two groups until the student gets to groups that contain only one button. Label each group according to the attributes used.

3. Identify and describe patterns (sound patterns, color patterns, shape patterns, patterns that grow in two directions).

4. Extend and create patterns (use pattern shapes, colored blocks, pictures or stamps).

5. Make connections between concrete patterns and number patterns.

6. Recognize, analyze, and extend number patterns on a 100's chart using odd /even patterns or counting by 2's, 3's, 5's, 10's etc.



Statistics and Probability

Collecting, organizing, describing, displaying, and interpreting data, as well as making decisions and predictions on the basis of that information are skills that are increasingly important in a society based on technology and communication. These processes can be used to solve problems that often are inherently interesting, represent significant applications of mathematics to practical questions, and offer rich opportunities for mathematical inquiry. The study of statistics and probability highlights the importance of questioning, conjecturing, and searching for relationships when formulating and solving real-world problems. Statistics and probability can reinforce communication skills as children discuss and write about their activities and their conclusions. Within mathematics, these topics regularly involve the uses of number, measurement, estimation, and problem solving. (NCTM, 1989, p. 54)

Objectives

1. Collect, organize and display data from classmates, families, or members of the school community.
    - Conduct surveys to gain information about facts or opinions of peers. (Facts: Pets, birthdays, brothers and sisters, bed time.
      Opinions: Favorite fruit, favorite sport, favorite holiday.)
    - Use tally marks, symbols, or other method for recording data.
    - Make pictographs, bar graphs, or pie charts to display data.

2. Make and test predictions.
    - We predict that more people in our school like juice than soda.
    - What number comes up most when rolling two dice? or How many rolls of the dice before you roll doubles?
    - What combination turns up most when spilling a given number of two-sided colored beans?

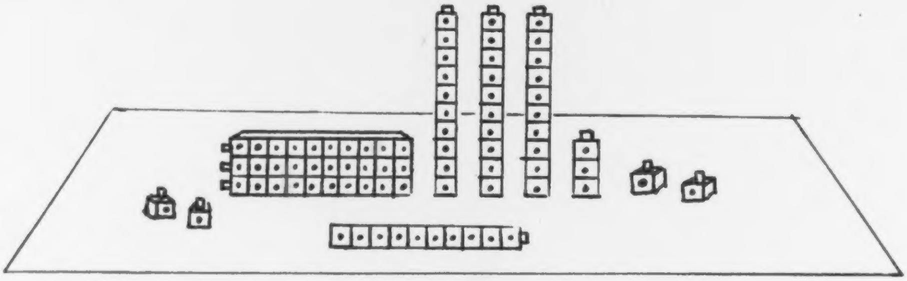
3. Interpret data by making comparisons and drawing conclusions.

    - Lead discussions by asking the following questions when analyzing a graph:

        Which column has the most?
        Which column has the least?
        How many more chips are there than paper clips?
        How many objects all together?

    - Make generalizations from the graphs.

    - Write arithmetic equations based on the information provided in the graph.



Measurement

Measurement is of central importance to the curriculum because of its power to help children see that mathematics is useful in everyday life. Measurement helps develop basic mathematical concepts and skills. Measuring encourages children to be actively involved in solving and discussing problems. Children need to understand the attribute to be measured as well as what it means to measure. Estimation should be emphasized because it helps children understand the attributes and the process of measuring as well as gain an awareness of the sizes of units. (NCTM, 1989, p. 51)

Objectives

1. Compare objects by matching.

    - Find items in the classroom that are the same length as parts of the body, a book, straws.

- Ask children to compare their heights with one another.
- Use containers that vary in size and shape to compare capacity.
- Use a balance scale to compare weights.

2. Use nonstandard units (such as blocks, cubes, buttons, paper clips, erasers, parts of body) to estimate and measure length, weight, and area.
3. Choose appropriate standard units for measuring and comparing.
4. Make estimations.
5. Identify value of coins and select coins needed to purchase items.

For example: Create a market in the classroom with collected items or items made by the children. Set prices and let the children purchase items using colored chips or colored paper currency. Children will be both buyers and sellers.

Geometry and Spatial Sense

Geometry helps us represent and describe in an orderly manner the world in which we live. Spatial understandings are necessary for interpreting, understanding, and appreciating our inherently geometric world. Insights and intuitions about two- and three-dimensional shapes and their characteristics, the interrelationships or shapes, and the effects of changes to shapes are important aspects of spatial sense. Children who develop a strong sense of spatial relationships and who master the concepts and language of geometry are better prepared to learn number and measurement ideas as well as other advanced mathematical topics. (NCTM, 1989, p. 48)

Objectives

1. Explore, describe, classify and construct shapes.

    - Find examples of shapes and solids in the classroom, school, or outside environment.

    - Describe attributes of the shapes identified. (It has corners/no corners; rolls/doesn't roll; stacks/doesn't stack; 4 sides/more than 4 sides.)

    - Create different size triangles or four-sided figures on a geoboard.

2. Recognize symmetry and congruence.

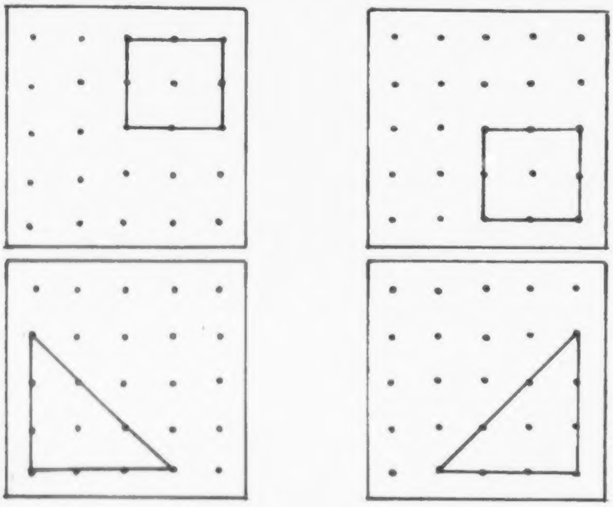
    - Fold shapes to discover lines of symmetry.

    - Use square tiles to create dominoes, triominoes, tetronimoes, and pentominoes; try to find all the possible arrangements.

3. Compute perimeter and area.

    - Estimate and then measure the perimeter of a piece of paper, table top, rug, or outdoor play area using blocks or footsteps.

    - Use paper squares to fill the area of figures created on the geoboard.



Sample Lesson Plan: Developing Number Sense

Talking and Thinking about the Calendar

Objective

As children develop a strong sense of numbers they understand the relationship of numbers to each other. They are able to tell when an answer or unit of measurement is reasonable. This activity encourages children to use numbers and words to describe relationships on a calendar. The purpose of this activity is to have children continue to develop a mathematical vocabulary related to time and to develop an understanding of the passage of time. This activity expands the daily exploration of the calendar to consider the whole month.

Materials

A large classroom calendar

A monthly calendar for each child or for a pair of children

Procedure

Begin by focusing attention on the large calendar. Ask the following questions in a relaxed, open manner:

> What is today's date? What was yesterday's date? What date will tomorrow be? In two days, what will the date be?

Next, look at the month calendar. Ask: How many days are in this month? What day of the week is today? How many more days until Sunday? Last week, on what day was Sunday? What will one week from today be? Two weeks from next Saturday will be what date? Have the children work in cooperative pairs to answer these questions. Allow them "thinking " time to respond; give everyone who wants a chance to respond.

Ask the children to compare the number of school days with the total number of days in the year.

> Which number will be greater? Which number should be added to today's date to find the date in exactly one week? What two numbers should be added to get today's date? Why is it not possible to have six Saturdays in a month?

Have the children draw a big X on the calendar to connect the days in two weeks. Then ask the children to add the numbers joined by the lines.

> What do you notice about the number?

Try this again with other pairs of days.

> Why do you think you are getting similar results?
>
> If you make your X bigger and add three numbers in a row, what do you think will happen?

Encourage the children to create similar problems and solve each other's questions. Suggest that they look for patterns on the calendar as they create new puzzles and describe the patterns orally or in writing.

Sample Lesson Plan: Whole Number Operations

Addition with Beansticks and Counters

Purpose

Research has shown that children learn best when they are actively involved with learning experiences. Many different materials can be used in these activities: beans glued onto same sized, flat sticks, dominos, paper clips, small cubes, or any other easily handled item. Teachers and children together can be creative in an ongoing search for adaptable materials. This activity offers a chance to use manipulative materials to solve problems involving two digit addition and subtraction. The purpose of this activity is to have children explore the effectiveness and usefulness of addition and subtraction algorithms.

Materials

Glue, beans, same size sticks, paper, pencils

Procedure

To make the bean sticks have the children glue ten beans onto each stick. Let the glue dry. Each child should make ten sticks of ten beans each. Nine additional single beans should be available for each child. Once the glue has dried, the children can begin using the sticks to represent or model numbers.

Have the children show 30, show 80, show 50.

Have the children use the single beans to show the "in-between" numbers, for example, show 19, show 27, show 48, show 35.

Ask if 35 could also be represented as 2 tens and 15 ones?

Ask, if we add another beanstick, what will the number be?

What if I build 58 and add 6 more loose beans, what would the model look like? Should I "trade " any beans or sticks?

When you are sure the students understand the use of these manipulatives ask two students to each name a two-digit number less than 50 (for example 48 and 35). Then ask the students to make up a story in which these two numbers would need to be added. Record the problem on the chalk board for all to see. Encourage the children to decide what the total will be and record all the answers.

Ask the children if their beansticks would be helpful in finding an answer to the problem. Have different students share their thinking with the class. Repeat the activity several times. No attempt should be made to restrict the addends to those that will not require renaming. Ask: Are there more than ten loose beans? What could we do? Are there ways we can record what we are doing?

Sample Lesson Plan: Classification and Patterns

Odd and Even Numbers

Purpose

This activity builds on pattern activities that are promoted for use with younger children. The purpose is to introduce children to the patterns resulting from the addition of odd and even numbers.

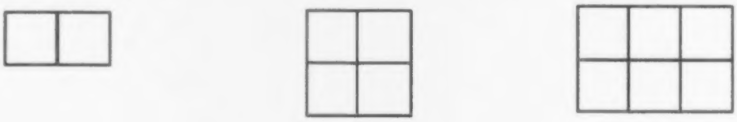
Materials

Have students work in pairs; each pair will need twenty-one counters, two sheets of graph paper with large squares, scissors and a single die.

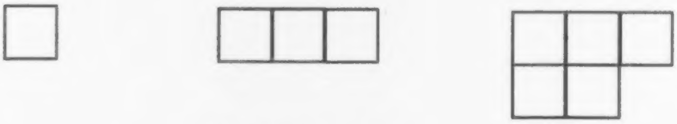
Procedure

Begin by having the children use their counters to show numbers that are even and odd. We call this making a model of a number. Have the students explain what they have done so others can do the same. Ask them to use their counters to model all the numbers on their die, and to group the models into odd numbers and even numbers.

Each student should record the models on graph paper and cut out the six models.

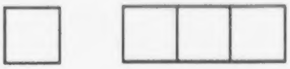


Even Numbers



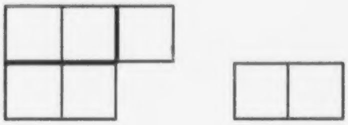
Odd Numbers

Have the children take turns rolling the die and identifying the number rolled as odd or even. Tell the partners to add their numbers by putting their paper models together and to tell if the sum is odd or even. Encourage them to roll their die several times and to model each addend and the sum of the addends, each time telling each other about the sum.



1 + 3 = 4

odd + odd = even



5 + 2 = 7

odd + even = odd

When you are sure your students understand the task, have each pair make a table like the one shown below as they roll their die and model the sums.

Addend	Addend	Sum
3 odd	5 odd	8 even
3 odd	4 even	7 odd
2 even	7 odd	9 odd
6 even	2 even	8 even

After they have entered several lines in the table, ask them if they see any patterns and to describe what they notice. Suggest that they test their ideas with other numbers. Encourage the children to explain in their own words their findings that the sum of two even numbers is even, that the sum of two odd numbers is even, and that the sum of an even number and an odd number is odd.

(Adapted from *Curriculum and Evaluation Standards for School Mathematics Second-Grade Book*, National Council of Teachers of Mathematics. (1989). Reston, VA.)

Sample Lesson Plan: Statistics and Probability

Dice Roll Game

Purpose

This game provides children with the opportunity to play a game of chance and graph the results. The children are encouraged to make a prediction, or thoughtful guess before they begin to roll the dice.

Materials

A set of dice for each pair of students, paper numbered across the bottom 0 - 12, colored markers or crayons.

Procedure

Have the children look carefully at the dice they have at their tables. Ask for their observations about what they see on each die. Ask them to make a guess about what number will turn up most often when the dice are rolled fifty times. They should write down their guesses, then take turns rolling the dice, add the total and color in a box in the row corresponding to the number rolled.

After about twenty or thirty minutes of partners playing the game together have the children share the results of their findings. The partner graphs could be displayed with written comments from the class about the results. What number appeared most often? Was there a range of numbers which appeared? Why did particular numbers occur more often than others?

Variation

For younger children or at the beginning of the year use one die. Try adding a third die for a challenge.

Sample Lesson Plan: Measurement

Purpose

This activity is designed to help children begin to understand and appreciate the need for standard units for measurement. Children are given many opportunities to use a variety of measuring units both standard and nonstandard.

Materials

A variety of objects to be used for measuring such as: pencils, pens, paper clips, cards, small blocks, etc. (any objects will do); individual pieces of paper for each team.

Procedure

Tell the children that you will explore the idea of measurement. Ak what do we do when we measure something? Why would we want to measure an object? Have they ever seen anyone measure things? Who uses measurement in their job? Or, in what kinds of work do people depend on measurement to do their work well?

The children should work in teams of two or three to do this activity. Have the children choose three things in the room to measure. Their task is to use two different units or objects to measure the articles they choose. For example, one team of children may want to measure the door, a table top, and one child's foot. They then select two objects to measure the objects with, for example a marker and a paper clip. One team member is designated as the recorder, another as reporter. They proceed to use each of the two objects to measure the table, door and foot. The results are recorded. Their paper may look like this:

OBJECT	PAPER CLIPS	MARKERS
door	147	13
table	85	5
foot	12	11/2

Allow about 20 to 30 minutes for children to complete this activity; if some children finish sooner than others have them choose one or two more things to measure and record. When everyone has completed the task, have the reporter from each team share the results by telling:

1) what things in the room they measured
2) what object was used as a measuring tool
3) what the measurement was

Allow time for a discussion to compare the various results. Have the children draw conclusions about the need for a standard unit of measurement for all people to use.

Extensions

Have the children estimate the possible measurement before they actually begin to measure.

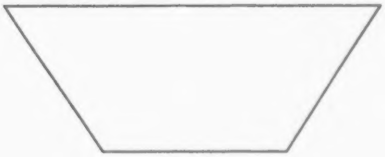
Have the children estimate, then measure the circumference of a pole or pumpkin or ball using string and compare the results.

Sample Lesson Plan: Geometry and Spatial Sense

Pattern Block Game

Purpose

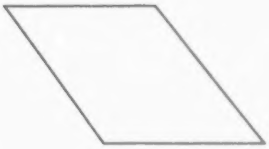
Young children should explore geometric shapes and spatial relationships among objects freely. The use of manipulative material is crucial in this exploration. Games can be played in the classroom to find specific shapes in the surroundings. Children can be challenged to be on the look out for a particular shape in the school, as they walk home and in their homes. The first level of geometric learning is that of whole shape recognition. That is, visually and tactually recognizing a shape by the physical appearance, not by parts or properties. A person at this level can learn geometric vocabulary, identify specified shapes, and reproduce a given figure.



Cover with one piece.

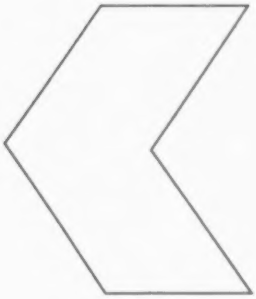
Cover with 3 pieces.

Cover with 2 pieces.



Cover with one piece.

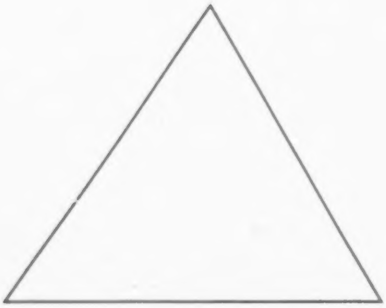
Cover with 2 pieces.



Cover with 2 pieces.

Cover with 3 pieces.

Cover with 4 pieces.



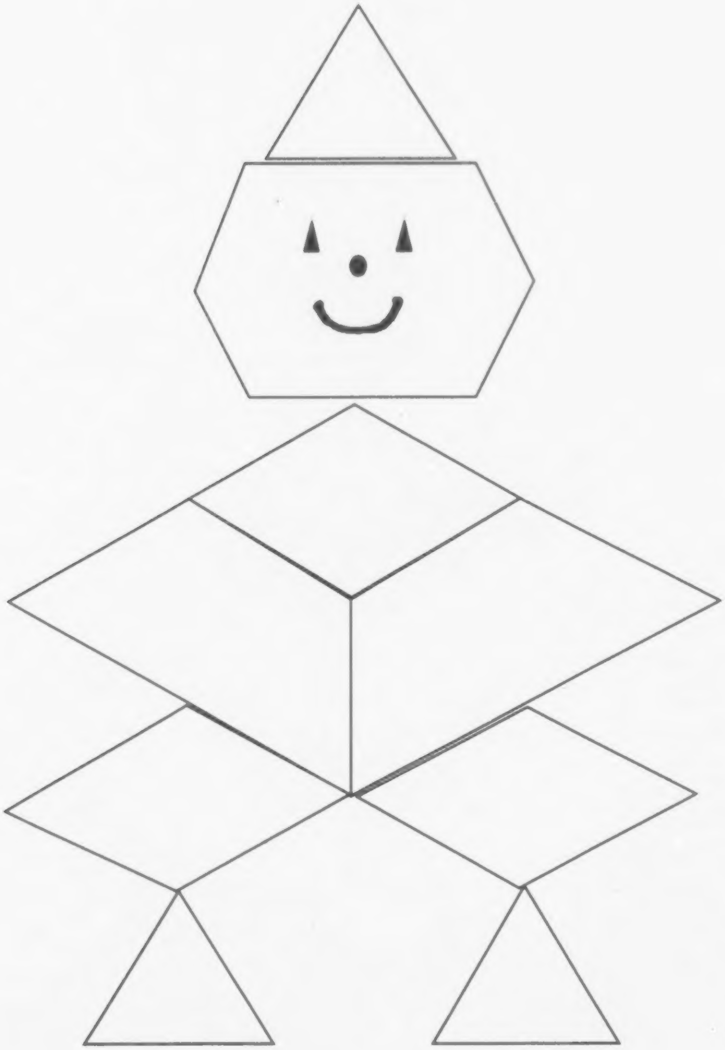
Cover with fewest pieces.

I used ____ ____ pieces
____ ____
____ ____

Cover with the most pieces possible.

I used ____ ____ pieces.

If yellow is one, how much am I?



If red is one, how much am I?
If blue is one, how much am I?

Summary

Teachers in the Step by Step program have an opportunity to create an excitement for mathematics while promoting literacy and critical problem solving skills. Problem situations (such as cooking, building projects, measuring, or data gathering) that have meaning to the children can be absorbing and stimulating. As they explore a variety of materials, students will be better able to make connections and to communicate mathematically with success. Working in partnership with families and the community, teachers can increase their students' understanding of how mathematics works in their lives.

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XII. SCIENCE

XII. SCIENCE

> *I would rather learn from one bird how to sing than teach ten thousand stars how not to dance.*
>
> e.e. cummings

Overview

A well-balanced science program for young children provides science experiences that are inquiry-based, include technological problem solving, and integrate, where possible, with other disciplines. These experiences help children understand physical, earth, and life science concepts and help them to develop science process skills: observing, comparing, contrasting, measuring, communicating, recording, organizing and interpreting data, inferring, predicting. Science experiences also provide children with opportunities to apply these skills and concepts to actual life situations. In a quality science program, students have access to skilled enthusiastic teachers and adequate classroom time for science exploration. There is a rich array of learning material available for use, adequate work space, and ready access to community resources. The Step by Step Primary Program hopes to assist schools in refining their science programs to achieve these goals.

Science content for this chapter is drawn from the physical (electricity, time, and magnets), biological (food chains and herbs), and earth (water and rocks) sciences. These topics are intriguing to the older primary student and the activities provided will help students understand their world and establish a knowledge base to also understand some of the fundamental ideas of science. Science educators are encouraging an understanding of science concepts and developing abilities of inquiry rather than knowledge of a large body of scientific facts. They encourage providing children with opportunities to increase their understanding of things happening in their day-to-day lives, particularly in the earlier grades.

Inquiry and direct experimentation are among the teaching methods advocated for doing the activities in this chapter. Steps in an investigation are outlined for the children or they are guided toward fashioning investigations of their own. In some activities, students are encouraged to formulate questions, devise ways to answer them, and present their results to classmates (i.e., Figure out a way to use recyclable materials to construct a timekeeper device). Other activities might involve direct observation, data collection, and reflection (i.e., Identify the properties of a rock and reflect on these properties to determine a possible use for the rock).

These lessons provide opportunities for oral and written discourse that helps focus students on understanding how they know what they know and the way that their knowledge extends to the world around them. As students grow in the development of knowledge, understanding, and abilities, they should be able to communicate their observations with increasing accuracy and detail orally, in written form, and in their drawings. These student observations are useful in assessing student progress.

Science is a collaborative endeavor and should be taught using a combination of whole-class instruction, small-group collaboration, and individual work. For example, being in pairs might be more effective when students measure intervals of time kept by prototypes of historical timekeepers, such as a drip clock, while designing and building a timekeeper might best be explored individually.

Teachers are important role models. Those who enthusiastically engage in inquiry with their students and are responsive and respectful of students' differing questions and comments instill in their students some of those same attributes towards science.

Life Science

Food Chains and Webs

Concepts

All life depends on energy for its continued existence. This energy comes in the form of chemical energy stored in food. The sun is the original source of all energy, and green plants are the only living things that can change the sun's energy into food energy through the process of photosynthesis. Every food chain begins with a green plant, and continues with animals that eat plants, and then animals that eat other animals. When an animal at the top of a food chain dies, nutrients are released back to the soil by decomposers. Two or more food chains that are interconnected compose a food web. Altering one part of a food chain or web can have repercussions on many other parts. Predators have a variety of strategies to capture their prey, and prey animals also have different strategies to avoid becoming eaten.

Sample Lesson: Food Chain Tag Game

Objective

Through this activity, students will:

- Begin to understand the concept of a food chain.
- Think about the interdependence of different elements of the environment.

Materials

- Name tags for different participants in the game (crickets, frogs and hawks; or grass, rabbits and foxes; or whatever plant, plant eater and meat eater is common in your area). Punch holes in a cardboard tag, attach a string and hang around child's neck.
- Bags to represent stomachs for storing food. (Clear bags work well, and can be labeled cricket, frog, hawk.)
- Some material to scatter to represent food: popcorn, cereal, acorns. (The advantage of using a food material if you are playing outdoors is that any food leftover material will be eaten by birds and squirrels.)
- A tarp or piece of plastic, bed sheet, or large towel to be designated a safe area
- Whistle

Procedure

1) Begin the class by discussing with the students what they ate for breakfast, and where the energy in that food came from. If they had cereal or bread, it came from wheat, and the wheat got its energy from the sun. If they had milk with the cereal, it came from a cow, and the cow ate grass and the grass got its energy from the sun. Tell the children that they are part of a "food chain," and that every food chain begins with the energy of the sun. The only thing that can turn the sun's energy into food energy is a green plant, which does it by the process of photosynthesis.

2) Examine some pictures of food chains in the forest, sea, rainforest, and other environments.

3) Tell the children that you will be playing a tag game that will simulate a food chain. The object of the game is to stay alive, and to stay alive they have to do two things: a) not be eaten by a predator and b) eat enough so that they do not starve to death. Hawks eat only frogs, frogs eat only crickets, and crickets eat only corn (represented by the popcorn). The food gathered by an animal goes into its bag, which represents the stomach. When they tag another person, it is the same as eating them in the game. The person who has been eaten should pass their stomach bag to the predator and then sit out in a predesignated area for the rest of the round. In order to be alive at the end of the game, a cricket's bag should be 1/3 full, a frog's bag 2/3 full, and a hawk should have a full bag.

4) Spread the popcorn or other "food" on the ground (outdoors is best). Designate a "safe area" with the tarp or fabric where animals can go at any time during the game for 20 seconds to avoid being caught. Begin by letting the crickets feed undisturbed for 30 seconds. Then release the frogs, and 30 seconds later release the hawks. After five minutes, blow a whistle to halt the game and determine which animals are still alive. Change the roles of the students. Once the children understand the basic format of the game, you can alter some parameters. What happens if you increase or decrease the number of hawks? What happens if there is a drought and all the plants die? What happens if a toxic chemical spill kills all the frogs? The children quickly will see how interdependent all the parts of the food chain are.

Assessment

- Students can demonstrate competence by playing the game according to the rules outlined.

- Children can demonstrate comprehension and the ability to apply what they have learned by correctly predicting outcomes of the different scenarios before playing a new game.

Additional Activities

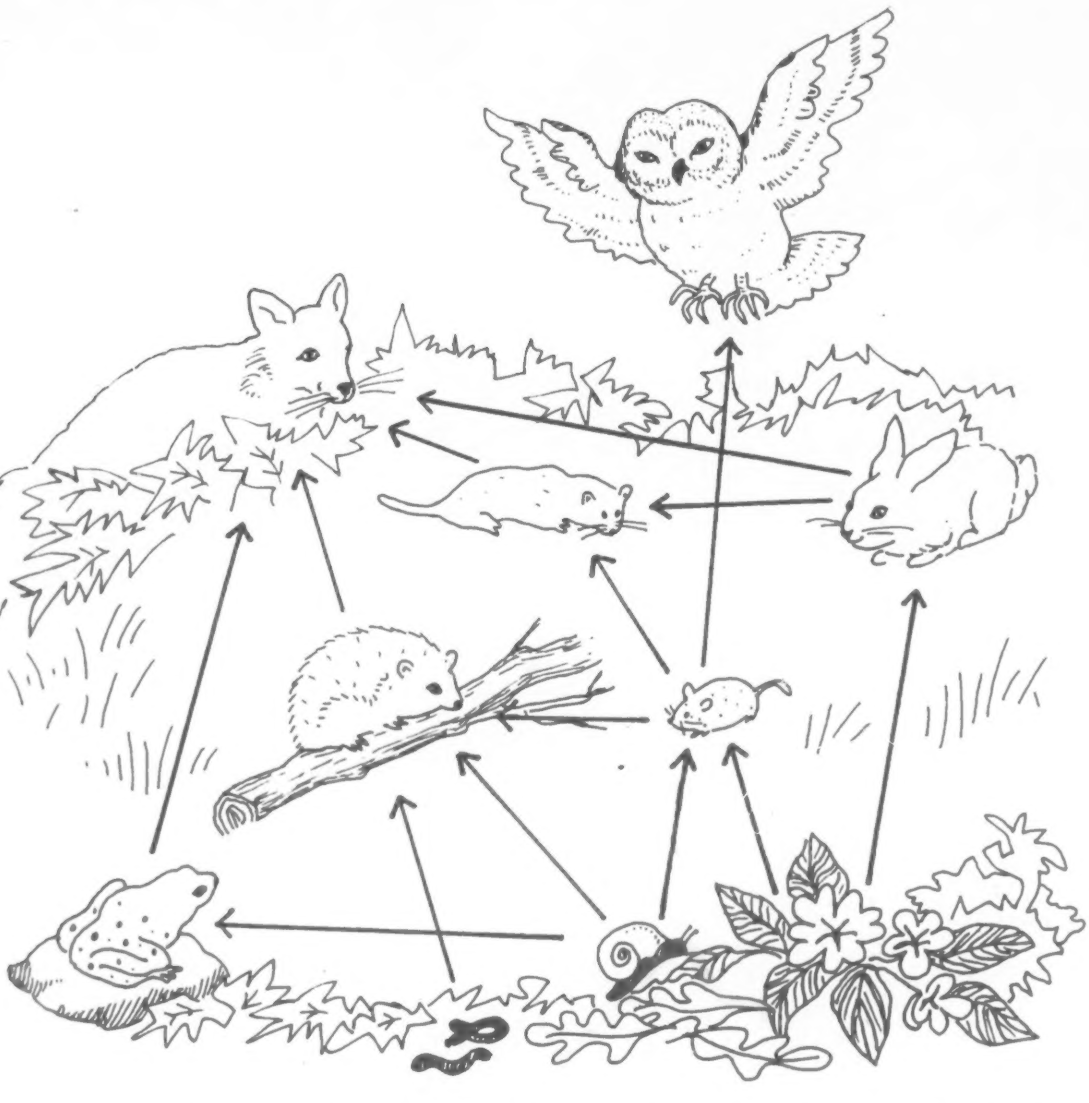
- Create a mural or different habitats (ocean, arctic, savannah) and have each child create a plant or animal for the mural. Connect the plants and animals with yarn to show the food webs.

- Analyze the different food chains in the school lunch. For instance, sun → grass → (cow) milk or sun → corn → (pig) ham or sun → wheat → (bread).

- Create a food web by having each child wear the name of an element of the web (either taping the name tag to the child, or wearing it on a string around their neck). Begin with the energy from the sun (the teacher). Holding the end of the string, pass a ball of string to the next element in the food web: a green plant (grass, algae, tree leaves). The child who is the green plant then chooses an animal that might eat him or her (a snail, earthworm, deer, or mouse) and passes the ball of yarn to them, while holding onto a piece of the string. That child in turn holds onto a piece of string and passes the ball to a meat eater (an owl, a fox, a turtle). When the string gets to a predator that will not be eaten by another animal, the predator dies of old age and the ball of string is passed to the decomposers (ants, worms, bacteria), who release the dead animal's nutrients back to the soil, and the string comes back to the sun to begin another chain. Soon you will have built an elaborate web by unwinding the string. Have the children tug on one part of the web to represent an environmental disturbance or change in balance, and every other part of the web should be able to feel the tug, thereby demonstrating the interrelatedness of all elements of the web.

- The children can create food chains to decorate the room by starting with a small paper circle that represents the sun. Add links of the food chain by stapling or gluing strips of paper into a circle and adding more links from the sun out. Draw or cut out from magazines pictures to glue on the different links: green plant, plant eater, meat eater, decomposer.

- Challenge the children to use recyclable materials to create a predator invention that could help a creature capture its prey (either real of imaginary). It may be a totally open challenge, or focused on a particular environment (under the sea, in the rainforest canopy), or focused on a particular type of prey (animals that live in shells, animals that fly, animals that swim). Teachers may want to begin this class with a discussion of different ways real animals have solved this challenge (the speed of a cheetah, sharp jaws of a shark, sticky silk of a spider, stealth of an owl, poison of a cobra,



stinging tentacles of a jelly fish, constrictions of a boa). Remind the children that predators are not bad or mean animals, but are doing what they were designed to do when they kill another animal for food.

- Challenge the students to create a camouflage potato bug or another animal that can hide in a particular environment (the classroom, the schoolyard). Make different materials available (pipe cleaners, toothpicks, colored markers, cotton swabs, feathers, fabric squares, thumb tacks). After giving the children sufficient time to create their potato creature, have half of the children place their creatures in the environment while the other half of the class is not looking. The children who did not hide creatures are then given a few minutes to walk through the target area to see how many creatures they can find. Which ones were camouflaged the best? How? Switch roles and let the other group search.

- If teachers have access to owl pellets (the indigestible remains of fur and bones that an owl coughs up once a day), students can discover forest food chains while also learning skeletal anatomy. The class can analyze the number of different prey animals (usually rats, voles, mice and shrews and occasional birds) and rate their owl's success as a predator.

Herbs

Concepts

Traditionally, the word "herb" refers to any plant or plant part valued for its savory, medicinal, or aromatic qualities. Many of the aromatic herbs originated in the Mediterranean area, such as parsley, sage, rosemary and thyme. Although most herbs have non-woody stems, certain woody plants, such as rosemary, are also known as herbs. Throughout history, herbs have played an important role, providing humans with spices, medicines, scents for soaps, lotions, candles and other products, and fibers for making clothing and paper. The discovery of the medicinal properties of different plants was probably serendipitous; once a discovery was made, it would often be passed down from generation to generation. Many of today's medicines contain some of these natural components. After thousands of years of usage, herbs have rich histories depicted in the folklore, art, poetry, and religion of many different cultures.

Sample Lesson: Problem Solving with Herbs

Objective

Through this activity, students will:

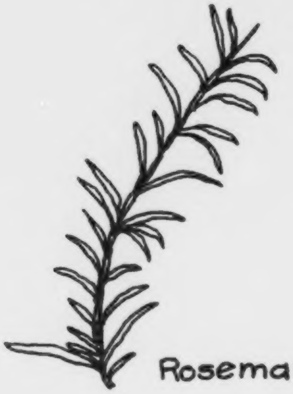
- Be introduced to the sight, smell, texture, and where appropriate, taste of herbs.
- Have opportunities to identify characteristics that are shared by certain herbs.
- Investigate some of the many uses of herbs.
- Increase their appreciation for the many uses humans make of herbs.
- Grow herb seedlings, observing and recording their growth.

Materials

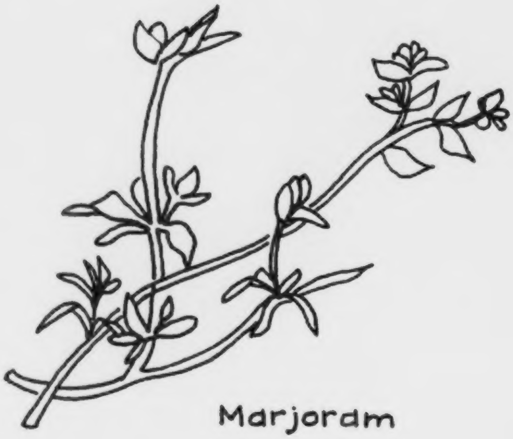
- At least 10, small, potted herbs that have been used for medicinal, culinary, or aromatic purposes
- Labels for each pot with the name of the herb and its traditional use
- Large unlined index cards or other paper for herb sketches
- Colored pencils for herb sketches

Procedure

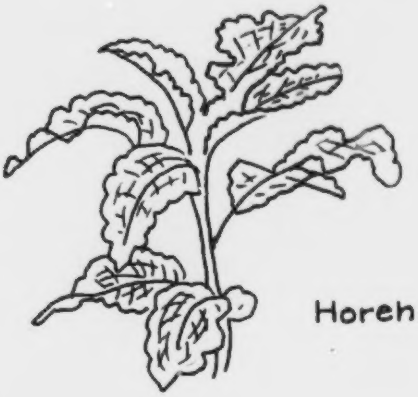
During a study of herbs, teachers can tell students to ask parents, grandparents and older friends about memories of plants or plant parts that have been or presently are useful to them. These discussions can extend beyond plants as basic foods, and focus upon plants that are useful in other ways. In class, students can share memories, historical facts, or folklore associated with plants that these people recall.



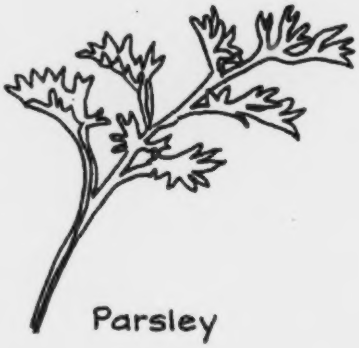
Rosemary



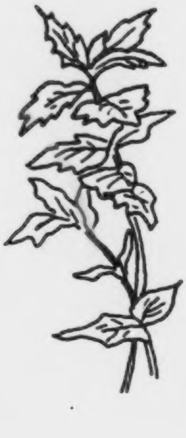
Marjoram



Horehound



Parsley



Spearmint

The teacher needs to choose at least 10 herbs that may be of special interest to the children for a more in-depth study.

1) Obtain or grow a small pot of each of these herbs. (You might ask a local gardener or a commercial garden center to contribute these to your program.) Ideally this group of herbs will be related to one of the topics currently being studied in the classroom. For example, social studies themes can provide a springboard for exploring the relationships a particular culture had with plants. How did groups indigenous to a particular region (perhaps your own neighborhood!) use and relate to plants? Or, how did the people of Ancient Greece or people living in the Middle Ages use herbs?

2) Demonstrate how to rub an herb's leaves between the fingers to release the plant's essential oils. Wave your fingers under your nose to show how one smells the scent produced.

3) Divide students into co-operative groups and give each group a different herb, labeled with its name and traditional use.

4) Explain that students are going to act out problems that the people in the culture being studied would have solved or treated with one of their potted herbs.

5) Whisper a medical or some other such problem into a student's ear, such as "Ouch, I am being bitten by these pesky mosquitoes!" The student dramatizes the situation.

6) Ask classmates to consult the informational tags on their plants to see if they can help. In the situation just described, someone in the group with a potted parsley plant would exclaim, "Here, rub this parsley (Petroselinum crispum) on your skin. It is a natural insect repellent and should help get rid of those mosquitoes." Students have fun as they act out the scenes, and they are surprised at the many ways in which herbs are used. Some commonly used herbs are: spearmint (Mentha spicata), believed to settle an upset stomach; sage (Salvia officinalis), used to treat "disorders" of the brain (a favorite for children to act out); and tansy (Tanacetum vulgare), used to treat vomiting.

7) Remind students that although the herbs used in the classroom are safe, they should not experiment with plants they might find elsewhere—some plants are poisonous and others may cause rashes or stings. Before using any herbs in classroom studies,

be sure to research any possible allergic reactions.

8) Ask each co-operative group to write a description of their herb and then have students place the herbs in a central location in the room.

9) Collect the written descriptions. When you read them aloud have students from the other groups try to identify which particular herb is being described.

10) Challenge students to identify characteristics that are shared by several of the herbs. Can they divide them into subgroups based on these similarities?

11) Let children sketch their group's potted herb (or their favorite of the herbs being studied). These drawings can be bound into booklets or arranged into a beautiful herbal "quilt" wall hanging.

Assessment

Children may be evaluated on:

- How cooperatively they work in dramatizing situations in which herbal remedies might be useful.
- How accurate and thorough the verbal descriptions given for each herb are.
- How they work together to divide a group of herbs into subgroups based on similarities.
- The degree to which individual herb sketches accurately reflect visual and verbal observations.

Additional Activities

- Research and practice some herbal dyeing in your classroom. Indoor garden herbs that are good for dyeing include: catnip, marigolds, marjoram, morning glories, parsley, rosemary, sage, and zinnias. Have children staple material to be dyed to a craft stick with their name penciled on it (sections of raw washed wool or yarn take up dye effectively). Prepare the dye pot by bringing to a boil one to two cups of cut-up plant products (experiment with flowers or leaves and stems) in a pot of water. Simmer for about an hour, strain out the plant material and add the wool to be dyed. Simmer the wool for about an hour and allow to cool. Remove the wool, rinse it in luke warm water, and hang it to dry. If a deeper color is desired, leave the wool in the dye pot for a longer period of time. Refer to the study of the wool process in Chapter XIII for more information and classroom application of this lesson.

- Identify herbal ingredients in soaps, shampoos, cosmetics, and lotions.
- Explore the use of herbs in different cultures.
- Cook an international meal using herbs as seasonings.
- Make aromatic herbal sachets from dried herbs in fabric pouches (small squares of fabric tied up with yarn).
- Enjoy an herb treat. Wrap a lump of sugar in a mint leaf, put it into your mouth and slowly suck or chew on it.
- Visit an herb garden (this might be a grandparent's, neighbor's, or a botanical garden). Create a scavenger hunt with clues provided to help identify different plants in the garden by shape of leaf, scent, flower, or other means.
- Plant herb container gardens in empty milk cartons (punch drainage holes in the bottom) using seeds that are easy to germinate such as cress, chives, sweet fennel, dill, coriander, or summer savory. Ask children to pre-label craft stick row markers and use these to create rows in which to sprinkle a pinch of seeds. Cover the seeds with a handful of soil and keep moist by showering with a mist from a spray bottle. Keep a record of when each seed type germinates, and measure the growth of the seedlings over time. When the seedlings are about 2 inches tall, either let the children take them home with the salad dressing recipe given below, or bring in some lettuce and other greens and have a classroom salad party. Show children how to use scissors to harvest the seedlings, tilting the container so the freshly cut herbs fall onto a plate. Wash in a colander.

Teacher Tip

Recipe for Salad Dressing

- 1 teaspoon chopped seedlings
- 3 tablespoons salad oil
- 1 tablespoon wine vinegar
- salt and pepper to taste

Mix together seedlings, oil, vinegar, salt and pepper. Shake well. Pour over lettuce.

Remaining herbs may be added to a small quantity of salad oil and poured over torn up bread pieces and toasted to make croutons for the salad.

Physical Science

Static Electricity

Concepts

Electricity can occur in two very different forms: static and current. Current electricity moves through wires and other metallic objects. Static electricity is created when an accumulation of negatively charged electrons occurs in an object, usually due to friction. If enough negative charges accumulate, we can experience static electricity—such as when you scuff your feet across a rug and then get a shock when you touch a metal doorknob, or when a balloon is rubbed over your hair and then sticks to your head or the wall. Experiments with static electricity work best when air is cool and dry.

Sample Lesson: Testing Materials to Learn Which Are Affected by Static Electricity

Objectives

Through this activity, students will:

- Learn that not all electricity travels through wires.
- Learn that electricity travels in complete closed circuits.
- Determine the properties of materials that are attracted by static electricity.

Materials

- Balloons
- Wool socks or other woolen items
- Light items to test such as: pencil shavings, pepper, thread, scraps of paper, bits of Styrofoam, rubber bands, small pieces of aluminum foil, puffed rice cereal (all of these light items should be attracted to a negatively charged balloon). To keep the testing area clean, small items to be tested may be enclosed in a clear plastic tube or petri dish.

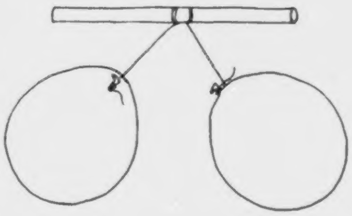
Procedure

1) Discuss with students that everything is composed of atoms—tiny particles that are too small to see with the eye, too small even for microscopes to see. The atoms, in turn, are made up of even smaller particles, protons, neutrons, and electrons. The electrons carry a negative charge, while the protons carry a positive charge. The neutrons are neutral, they have no charge. Usually the particles cancel each other, but sometimes a charge will accumulate in an object as a result of rubbing it or "friction".

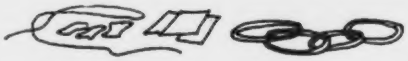
2) Rub a balloon with a wool sock. Ask the children to push their sleeves up, and extend an arm in front of them. Rub the balloon over their arm, and have them raise

their hand if they can feel a force causing the hair on their arm to raise. Explain that the force they are feeling is static electricity, caused by the attractive charge of the extra electrons on the balloon.

3) Give the students the opportunity to recount some of their own experiences with electricity at this point.



4) Challenge the children to make predictions about what kinds of materials may be affected by static electricity. (If you have already taught current electricity, make inquiries to see if the children remember the rule that only metals conduct. If you have already taught magnetism, see if the children remember that only certain kinds of metals are attracted to a magnet.) Tell the children that they will be predicting and testing a variety of materials to try to guess a rule about what kinds of materials will be attracted to a statically charged balloon.



5) You may want to make a worksheet for the children to record their results, following the format:

1. Name of test object: ____________________

2. Prediction (affected/not): ________________

3. Test result (affected/not): ________________

4. Conclusions: __________________________

____

Assessment

Successful completion of the task will result in correctly sorted piles of objects, and the child deducing that static electricity affects most light objects, but it is not a powerful enough force to visibly affect heavier objects.

Additional Activities

- Thales, a Greek who lived around 600 BC, discovered static electricity when he noticed that pieces of amber rubbed with cloth would pick up things like feathers and bits of cork. It wasn't until subatomic particles were discovered that an explanation for this curious phenomena emerged. Ask your students to repeat experiments with amber and see what they can discover and how they explain it.

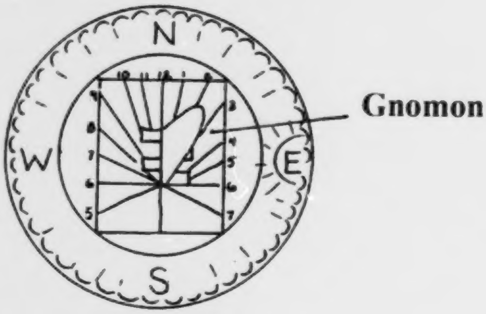
- You can bend a stream of water with static electricity. Let students predict, and then test, by slowly bringing a charged balloon near to a small stream of water in the sink. What happens if the balloon gets wet?

- Train a balloon dog to do tricks. Use a long sausage shaped balloon, inflated and tied off at the end. Draw the face, legs and tail of a dog on the balloon. Charge its back by rubbing a wool sock, telling the children that you are patting it because it is such an obedient dog. Put the "dog" on a table and tell it to "Roll over," then release it. Can the children figure out why it is so obedient? Let them experiment with their own dog balloons.

- Lightning is a form of static electricity that can be extremely dangerous or fatal. Explain that lightning results from the friction of ice and water particles in a thundercloud rubbing against each other and creating an excess of electrons on the underside of a cloud. These may be attracted to the surface of the earth, and thunder is the sound wave that results from the rapid heating of the air molecules. Review with children safety rules about lighting storms: they should get inside a building or in a car, if possible, or crouch low away from trees if they cannot get somewhere safe. They also should stay away from metal things and from water.

Time

Concepts



Sundial

Time is a subject that is often taught in early primary school when children learn to tell time on a clock face. The minutes and hours on the clock face are only one method of keeping time, and a somewhat arbitrary one. Anything that occurs at a regular interval can be used to tell when units of time have passed (such as movement of the earth, tree rings, geological strata, cycles of the moon). Children should understand that time can be recorded and measured. Throughout history man has measured time in a variety of fascinating ways. Experimenting with some of the historical ways of telling time can lead to ideas for inventing one's own timekeeping device. This helps in building a concept of time and how it is measured.

Sample Lesson: Inventing Devices That Will Measure Intervals of Time

Objectives

Throughout this activity, students will:

- Begin to understand that units of time are arbitrary, and that anything that occurs at a regular interval can be used to record and measure time.
- Be challenged to apply what they have learned about time to create their own timekeeping device.

Materials

- A variety of timekeeping devices, such as sundials, drip clocks, sinking clocks, sand hour glasses, a pendulum
- Stopwatches or watches with second hands
- Tools to create timekeeping devices such as: hammer, nails, scissors, utility knife, awl, wire cutters, pliers
- Compass or other sharp, pointed object for poking holes
- Different kinds of tape
- Cardboard pieces and boxes of various sizes, shirt cardboards, paper
- Cardboard tubes
- 1/2, 1, and 2 liter plastic bottles and tops
- Assorted plastic and paper containers such as yogurt cups, drinking cups
- Small cans

- Plastic tubing, coat hangers
- String, pipe cleaners, brass fasteners
- Marbles, small beads, washers, nuts and bolts
- Fine, dry sand, or salt
- Plastic basins to hold sand and to test water clocks

Procedure

These lessons may occur over a number of days. Developing an understanding of time and how it is measured is an extremely important task of childhood, and one that will take much exploration on the part of the students.

1) Begin by asking the students "What is time?" You may want them to write down their answers, or to share them with the class. Help them think beyond the obvious "time is the numbers on a clock." Eventually a child will mention that movement of the earth around the sun causes time.

2) Demonstrate how the earth rotates on its axis as it revolves around the sun (with a globe, a tiny doll standing on your country, a smaller ball as the moon, and a flashlight for the sun). Talk about day and night, and the change of the seasons. Discuss the discovery that shadows changed in predicable patterns each day and how it led to the invention of the sundial.

3) Make sundials with the children, using paper plates or paper circles, marking the hours on the face of the plate and cutting out a "gnomon" to cast the shadow on the plate. Discuss advantages of a sundial (it is fairly accurate) and disadvantages (it only works during daylight hours, only on sunny days, and is not portable).

4) Ask the children to create timekeepers using recyclable materials.

    - The ancient Chinese, Egyptians and Arabs are variously credited with the idea for a sinking clock. A coconut shell or clay pot with holes in the bottom was placed in a pail of water. The container would fill with water and sink after a certain length of time. The watchman would then sound a gong for the village. A modern version can be made from a small can with a hole in the bottom. It is remarkably accurate.

- The ancient Romans are credited with the invention of the drip clock, or klepsydra. The water drips from container to container in a steady flow, until it has all passed into the bottom container. The klepsydra was used in court to time the presentations of talkative defense and prosecuting attorneys. Then, as now, some lawyers were less than scrupulous, and muddy water was sometimes poured into the top. The children correctly guess that the silt slows the clock, hence giving the attorney more time to make their presentation. Plastic cups fastened onto a large sheet of cardboard or pegboard work well for a modern version of this timekeeper.

- Since water could freeze in the winter, the invention of the sand timer hourglass (allegedly by monks at a European monastery) provided a weather resistant timekeeping alternative. To understand how these timers work, have children experiment with sand running through different sized openings into various sizes of containers. Can they determine which factors affect the interval of time it takes for the sand to go through?

- Galileo noticed that a chandelier swaying in the wind took the same amount of time to make an arc (as measured by his pulse) whether it was blown far to one side by a big gust of wind, or barely set in motion. Experiment with pendulums. Change the length of the string that the weight (the bob) hangs from. Try varying the mass of the bob or the length of the arc. Which factors affect the time?

- Other early timekeepers include fire clocks (burning a string knotted at equal intervals or a candle marked off in equal intervals).

5) Ask the students to share their timekeeper creations with the class. They should explain with a demonstration of how and why their timer works, and if there are any changes or modifications they would recommend. You can decide that everyone will make a timekeeper that determines a set amount of time (for instance one minute), or leave it open for the children to determine whether there is a particular unit of time that would be most useful to them (a three-minute tooth brushing timer, or a 15-minute piano practice timer). Remind the children that a good timer should measure approximately the same interval of time with every use.

6) Let the children work with partners to test the interval of time that each timekeeper

measures using stopwatches or watches with second hands. Ask the groups to compare their results; for instance, does the sinking timer always take the same amount of time? Why or why not?

7) During the time children are working on constructing timekeepers, there should be a clearly designated sand area, water area, marble chute and pendulum area, and a supply area. Children should be instructed to never take anything wet to the sand area, as water will make the sand timers clog. Materials that they decide not to incorporate into their design should be returned to the supply area for someone else's use.

Tips

- Have lengths of heavy tape pre-ripped and loosely attached along the bottom edge of a cabinet or shelf for younger elementary students. Children should use heavy tape to seal up their timers only after testing to make sure they are reliable timers.

- An ice pick heated over an open flame will make holes in the plastic caps from soda bottles. Make smaller holes for water and larger sized holes for sand. It is recommended that the teacher do this in advance.

- Children attempting to construct a water version of the soda bottle hour glass will need assistance in discovering the need for a small pinprick hole just above the water line on both bottles. Otherwise, air cannot escape and the water will not flow down.

Assessment

- For the assignment to time different timekeepers, children may be evaluated on the correctness of their answers, and on their ability to work cooperatively with other students.

- For the inventing assignment, teachers may want to evaluate children on both the creativeness of their ideas, and their ability to execute their plan. Children who can explain what their inventions were intended to do can be given high marks for originality even if they were not ultimately successful in creating a working timekeeper.

Additional Activities

- Visit different timekeepers near your school: a church clock, a garden sundial, a train station with electronic clocks. How many different types of timekeepers can you find near the school?
- Research with students the history of timekeeping instruments, from shadow sticks to atomic clocks.
- Find a shadow from an object like a flagpole or street sign that falls on the playground early in the school day. Mark the shadow with chalk at regular intervals. Discuss what happened and why. Make sundials.
- Use stopwatches or homemade timekeepers to determine what can be done within a certain interval of time (e.g., How many times can you write the alphabet in 15 seconds? How many times can you sing your national song in 60 seconds?).
- Create a collection of timekeepers: the potato clock, wind-up spring type clock, digital clock, ball clock, ticker tocker timers, etc.
- Examine tree rings from different cut trees, and make crayon rubbings of these. Correlate the rings with different historical events (e.g., How old was this tree when World War II ended?). The same can be done with the rings on turtle shell scutes.
- Create a time capsule of objects significant to class members at that time in their lives. Choose a date to open the time capsule and plan a reunion.
- Test reaction times to things like catching a falling ruler or paper money, or passing a hand squeeze around a circle of people holding hands. See if practice can improve the reaction time.
- Explore geological time by creating a time line of the history of the earth. How do paleontologists date their discoveries? Use adding machine tape. Each meter equals 1 billion years.

- Learn about "horologics" or flower clocks; certain flowers open and close at certain hours of the day and can be used to tell time. Try planning a time-telling garden.

- Study time-telling in other cultures; the ancient Chinese, ancient Egyptians, Mayan and Zuni Indians are especially interesting. Learn about the mysterious 4000-year-old Stonehenge.

- Explore biological time: How do the leaves know when to fall? The bears know when to hibernate? The seeds know when to sprout?

- Create time machines and have children write stories about their imaginary visit to another time.

- Keep a moon diary for a month, drawing the phase changes and recording the time of their observations. Make a class moon calendar.

- Talk about an experience where time seemed to go fast and time seemed to go slowly.

- Count the number of timepieces at home.

- On a particular day, record every time children looked at a clock and what motivated them to check the time.

- Investigate time zones. How do they affect airplane departures and arrivals, the timing of telephone calls?

- Ask children to create their own personal time lines, specifying a minimum number of significant events, but leaving the format open.

Earth Science

WATER

Concepts

Water is essential to all forms of life on this planet. The earth's water is continuously moving through the water cycle. Water evaporates from oceans, rivers, and other bodies of water, transpires from plants, condenses into clouds, precipitates and falls to earth as rain or snow, collects in lakes and rivers and underground porous rocks, and eventually returns to the ocean. Water can change from a solid (ice) to a liquid to a gas (vapor), and back again. Water expands when frozen. Water has other special properties. Water has an invisible elastic skin that allows water molecules to bulge up in the center of a container. This property of water is called surface tension. The addition of a tiny bit of soap or detergent breaks the surface tension. Water molecules are attracted to other water molecules, a property known as cohesion. Water molecules are also attracted to other surfaces, a property known as adhesion. Some objects float in water, and others sink. A change in shape or load can result in a floating object losing the ability to float. Drinking water can have many tastes. Water mixes with some liquids, but not with others. Some substances disappear, or dissolve, in water. Water soaks into some materials, but not into others. Wet objects eventually become dry.

Sample Lesson: Water's Invisible Elastic Skin

Objectives

Through this activity, students will:

- Become familiar with the special property of water known as surface tension.
- Observe how water looks, tastes and feels.
- Compare the behavior of drops of water on various surfaces.
- Compare the behavior of drops of water with that of drops of other substances as they are moved around on wax paper.
- Discover other properties of water.
- Become aware of the many ways water is used.

Materials

- Clear glass full of water
- Cups and two or three different types of water for tasting (mineral, tap and carbonated)
- Several pieces of wax paper, 15 cm by 15 cm, for each student
- Droppers or sponge sections
- Bowl or pan of water
- Large sections of wax paper and a board for drop races
- Pictures of ways water is used
- Pan or container of water for each student

Procedure

1) Gather students around a glass of water and ask them what is in the glass. Ask them to support their conjecture with observations of why they think this substance is water. Why is water important to us? What are some of the ways we use water?

2) Have students taste the water samples and vote which is their favorite and why. Can they describe the different tastes? Discuss why waters from different sources or different processing procedures might taste differently.

3) Demonstrate how to move a drop of water around on a section of wax paper, and encourage students to experiment with their own drops of Mr. Water. What is the shape of the drop? From the bottom? From the top? From the side? Touch the drop slowly and then quickly. Try moving the drop around and pushing it closer and closer to a second drop. With a very quick movement two drops suddenly become one! Try separating this large drop into several smaller drops. Try to make longer drops. Who can make some small drops from one big drop? How did you do it? When you are finished making your observations, touch a large water drop with a toothpick dipped in detergent. What happens?

4) Extend the above experience by substituting metal foil squares for the wax paper. Do the drops behave the same? Observe rain drops rolling down a windowpane.

5) Hold a drop race by lining up drops of water, oil, corn syrup, and alcohol along a start line on a sheet of wax paper taped to a flat board. Ask students to predict which drop will win the race. Lift the board and see what happens.

6) Give students a container of water a piece large enough so that they can comfortably lay their hand in the water. Ask them to describe how water feels, making a list of all their observations. Is the water hard or soft? Smooth or slippery? Sticky or gritty? Holding one palm upward over their container, pour water onto that palm from a height of six to eight centimeters. How does the water feel on their hand? Soft, hard, or medium? Cold or warm? What else can they say about how the water feels? Does this change if they pour water from higher up? Make predictions, and then try it. Did students figure out that water poured from higher up feels heavier or harder because it has more force? Can students make any other discoveries?

Assessment

- Observations may be made about ways water is used, how it behaves, how it appears, feels, and tastes. What discoveries did students make about water?
- Students can dictate a letter to the teacher about their discoveries (or a letter to the water drop, Mr. Water, about the properties they found the most interesting or useful).

Additional Activities

- Estimate the number of drops of water that students think they can pile on a coin before it spills over. Ask them to try it and record their best three answers. Were they close? Why or why not?
- Count and record the number of coins that can be dropped into containers already filled with water. Do all the containers, when filled with water, hold the same number of coins before spilling over?
- Sprinkle pepper over water in a pie plate or bowl. Touch the surface with a drop of detergent and watch what happens.
- Go outside and smooth off a patch of dirt. Release drops of water from different heights and compare the size of the holes the drops make in the dirt. Measure the depths of the holes using twigs or toothpicks. Which has the greatest force, the drop released from high up or down low?
- A puddle makes a wonderful mirror. Find the clouds and tree tops in a puddle. Is anything flying over your puddle?
- Drop a small rock into the puddle. Do you see circles of waves that increase in diameter? What happens if you toss a square block into a body of water? Will the waves form squares? Do larger objects make bigger splashes?
- What happens to a puddle after the sun comes out? Outline the puddle with a string and check it a couple of hours later. Where does the water go?

- Does water have a shape of its own? Try pouring water from a circular can into a square or rectangular cake pan. Does the water take the shape of its container? Can you think of other liquids that do this?

- Give each student a single ice cube sealed in a plastic bag and challenge them to get theirs to melt the fastest.

- Shake some soil and water in a clear plastic container and watch it settle. Do heavier things seem to sink first? Use a coffee filter and try to separate the dirt from the water. Can you filter out the dirt, catching clear water underneath?

- Plant a terrarium and watch the water cycle at work on a mini scale.

Rocks and Minerals

Concepts

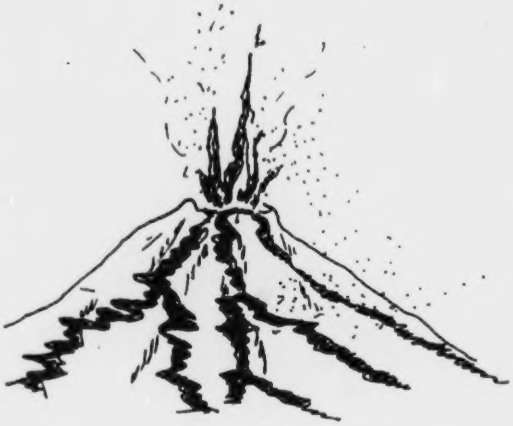
The planet earth can be compared to a hard boiled egg. It possesses an outer 6 - 70 km thick hard, rocky crust (the egg shell), beneath which lies a 2,900 km thick mantle of melted rock known as magma (the egg white). Under the mantle is the 2,300 km outer core of what is thought to be molten iron and nickel (the egg yolk), and the inner core with a diameter of 2,400 km which is thought to consist of solid iron and nickel (and is represented by an ink dot 1 cm in diameter at the yolk's center point). The theory of plate tectonics maintains that the earth's crust is divided into pieces known as plates. Scientists have identified 9 major plates and many minor plates on earth. These plates slide around in different directions and at different speeds on top of the molten magma (imagine pieces of a puzzle floating on a sphere of rising bread dough). The surface of a particular tectonic plate may be covered by part of a continent and/or part of the ocean floor. It is thought that volcanos, earthquakes, mountain and trench formation occur along the margins of the plates. The surface of the earth is constantly changing, sometimes due to rapid processes such as earthquakes, volcanoes, and landslides. Slow processes such as weathering of rock and erosion also contribute to these changes.

The earth's crust is made up of many different types of rocks, each of which is composed of one or more minerals (naturally occurring elements or compounds). Minerals are the

building blocks of the earth, with each mineral composed of only one substance, and that substance being the same in all samples of the mineral. Just as a few letters make up all the thousands of words in our language, about 3200 minerals make up all the different rocks on earth, but only ten of these minerals form 99% of the earth's rocks. Under the right conditions most minerals will form crystals that have a definite geometric shape.

Rocks can be divided into three groups, based on their formation. Igneous rocks formed when melted rock cooled and hardened. Sedimentary rocks formed in layers from bits of older rocks and parts of plants or animals. These might collect in low areas or under a body of water where they harden into rock over time. Metamorphic rocks formed when either sedimentary or igneous rocks were subjected to great pressure and heat. The texture, structure and composition of an older rock can be altered by heat and /or pressure changes.

The varied chemical and physical properties of rocks and minerals make them useful in different ways. For example, eroded rock is a major component of the soil in which plants grow, and the origin of all food products may be traced back to this rocky substratum (milk comes from cows, which feed on grass, which gets its nutrients from the soil in which it grows). In fact, everything on Earth that is not plant or animal is made of minerals, and even plants and animals cannot live and grow without their mineral components. Because they are an essential part of all life, as well as our natural resources, and because they exist in limited supply, minerals should be used wisely.



SAMPLE LESSON: Identifying Properties of Rocks and Minerals

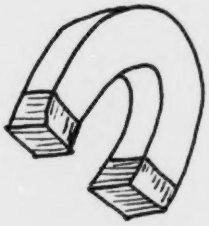
Objectives

Through this activity, children will:

- Develop an appreciation for the varied properties of rocks and increase their awareness of the many ways rocks play a role in their lives.
- Develop their inquiry skills and recognize the importance of using multiple tests to create a profile of a mineral through observation, manipulation, comparing and describing rocks.
- Experiment with some of the tests used by geologists to investigate the physical properties of rocks and understand that minerals differ in hardness, color of streak on tile, and reaction to acids and magnets.

Materials:

- Magnifying lenses
- A couple of magnets
- Unglazed white ceramic kitchen or bath tiles (usually the back of these tiles is not glazed), or commercially available streak plates
- A few steel nails
- Cup of vinegar and a few eyedroppers
- Paper towels
- Small container of water



Additional materials needed for the extensions of this lesson are as follows:

- A container for each student's rock collection

- A hammer and some old socks
- An assortment of rocks to be placed in a rock swap box a few at a time
- Candle secured in a candle holder or piece of clay and matches
- Matching pair of rocks per small group
- Examples of the three kinds of rocks (perhaps scoria or pumice for igneous; several pieces of sandstone plus limestone, shale, or coal for sedimentary; and marble, slate or talc for metamorphic)—sugar, table salt, alum, and Epsom salt
- Empty cardboard roll
- Clear plastic cup
- Sand of two different colors (white sand can be colored by shaking it in a bag or jar with a few drops of food coloring)
- Gumdrops and toothpicks
- Sand samples collected from several different locations

Procedure

It is recommended that this class be conducted after the first four additional activities described at the end of the sample lesson are carried out. While doing activity number four, children learn that some attributes are more useful than others in describing a rock. Tell them that they are going to role play being a geologist and use the tests of a geologist to discover the characteristics that make a favorite rock in their collection unique.

Geologists identify rocks and minerals by determining their properties. They test rocks to see how they react in certain circumstances. Geologists keep careful records of their rock discoveries, noting where they were found and which properties they possess. Rocks can tell interesting stories and it is the job of a geologist to be a detective and to discover these stories.

1) Ask children to examine their chosen rock and to write down at least four of its attributes.

2) Explain that geologists are not able to depend upon color for mineral identification because slightly differing amounts of the same minerals in two areas of the same rock can result in differences in coloration. A good example is quartz, which is normally colorless, but can appear as pink or blue or smoky. This can be discovered by children if they stir some colored sand, representing one mineral, into a clear plastic cup containing white sand representing a second mineral. Tell children to stir unevenly so that some areas of the sand receive more color than others.

   On the other hand, luster (the appearance of the surface of a mineral in reflected light) is a useful property to consider. Minerals are divided into two groups, metallic and nonmetallic, depending on their luster. Metallic minerals have a metallic luster like metal (aluminum, copper, gold), whereas those in the nonmetallic group do not. Some nonmetallic minerals may be glass-like, pearly, silky, dull, earthy, or greasy.

3) Set up the following stations: a) Scratch test—copper coins and steel nails; b) Vinegar test—cup of vinegar, eyedroppers, and paper towels; c). Streak test—several white unglazed ceramic tiles; d). Magnetic test—several small magnets; e). Float test—container of water and paper towels.

4) Explain and model how to use each station.

   - The scratch test is used by geologists to measure the hardness of a rock. A scratch is defined as a small crevice, and should not be removable by wiping with a damp cloth. The relative hardness of a mineral can be determined by comparing the specimen to a series of minerals assigned a number on a scale first suggested by Friedrich Mohs in the 1820s. Mohs selected ten relatively common minerals and rank ordered these from the softest (talc, which was assigned the number one, to the hardest, diamond, assigned the number ten. The Mohs hardness scale minerals, arranged from one to ten, are as follows: talc, gypsum, calcite, fluorite, apatite, feldspar, quartz, topaz, corundum, and diamond. Each mineral on the hardness scale can leave a scratch on any other mineral that has the same number or a lower number. Also, any mineral on the Mohs scale can be scratched by any mineral with a higher number. Children can determine approximate hardness by using materials at hand. The most frequently used materials are the fingernail (hardness about 2.5); a copper coin (hardness about 3.5); and a steel nail (hardness about 5.5). Have children carry out the scratch test in this order: fingernail, copper coin, steel nail (the copper coin can by omitted for simplicity). Soft rocks, like talc from which talcum powder is made, can be scratched with a fingernail. Slightly harder rocks will be impervious to a fingernail but not to a steel nail. Diamond is the hardest of all minerals. Nothing can scratch it, but it can scratch all other rocks and minerals. Can the children determine who has the hardest rock? The softest?

- The vinegar test is carried out by placing a few drops of vinegar in a scratch or on the surface of the rock under study. If bubbles form, calcium carbonate (found in limestone, marble and certain other rocks) is present. Also observe whether the vinegar is absorbed by the rock (indicating it is a porous rock).

- The streak test is made by pushing the rock across the surface of an unglazed white tile. Streak is the color of the ground-up or powdered mineral. The streak a rock makes may be a different color from the rock. Predict, then test, to see what color streak the rock will make on a tile.

- The magnet test is carried out by passing a magnet close to the rock and observing whether the rock is attracted to the magnet. Make a prediction, then record all of your observations during the test.

- Place a rock on the surface of a container of water and see if it will float. Does the color of the rock appear to change when it gets wet? Dry the rock and return it to the egg carton.

- Encourage children to take other rock samples through these tests, carefully recording all observations. Make charts of the properties of the rocks in their collection. Based on these properties, can children devise a use for some of their rocks? If a Rock and Mineral Guide or a rock sample identification box is available, students might try to identify their rocks. Alternatively, they might like to give their rock a name based on the properties it possesses.

Assessment

- Competence and comprehension can be assessed by observing children following directions as they move through the various stations. Do they understand how to carry out the tests, and can they explain the reasoning behind each test?

- Thoroughness and accuracy of observations and ability to record results can be assessed.

- Observe if children are willing to extend beyond the required assignment, putting in extra effort to identify properties of other rocks in their collection.

- Note when the children are creative in assigning names to their rocks and figuring out potential uses for them based on the properties they have observed.

Additional Activities

- Take children on a rock hunting expedition around the school, telling them to collect six rocks that are no larger than the size of an egg. You might carry along a hammer and something to place over the rock to protect the eyes from flying fragments so they can try to chip small fragments from larger rocks. Covering the rocks with old socks works well to protect the eyes while hammering rocks into pieces that can be shared. If a rock hunt is not feasible, bring in some river gravel (available from a plant store) or if all else fails, use coarse sand. Gravel and sand contain rocks in miniature. Give each child a box or container to house their rock collection. Create a rock swap box of interesting rocks you have gathered and from which they might take a rock, if they leave another in the box to replace it. Encourage children to add to their collections by searching for rocks at home or on weekend hikes. Allow them to wash their rocks and enjoy discussing, describing, and swapping them with classmates.

- Many of the minerals found in rocks are used to make products we use daily. Brainstorm with the children to identify some of the things in the classroom and at home that are mineral products.. Children might like to go on a mineral product hunt, then bring in an object they find that contains a particular mineral. Examples include chalk (calcite), soda can (aluminum), pencil "lead" (graphite), match head (sulphur), gold earring (gold), mirror or drinking glass (quartz), foil (aluminum), metal toy (aluminum and/or steel, which is made from iron), talcum powder (talc), metal scissors (aluminum or steel), and a silver spoon (silver). These could be used to create a sorting game or a mineral product classroom museum.

- For this activity each group will need a steel nail, a white unglazed ceramic tile, and a pair of matching rocks. Divide children into groups and give each group a different type of rock in a bag. Arrange the matching set of these rocks on a small tray and cover them. Challenge each group to write a description of their rock (keeping the rock hidden from the other groups), sufficiently detailed so that when it is later read to the class someone will be able to identify the matching rock on the tray. Tell children that they can use the nail in their bag to see if it will scratch their rock. The tile is to be used as a blackboard to see if their rock will "write" on the tile. When the groups have finished writing descriptions of their respective rocks, they can exchange descriptions and gather around the tray of matching rocks. A member of each group then reads another group's rock description and works with team members to identify that rock. Discuss what attributes are most useful in identifying the rocks. Was the color of the rock useful? What about texture, hardness, heaviness, or whether the rock was shiny or dull? Why aren't size and shape useful in rock identification? Can the children sort the rocks into groups based on their observations? What rules did they use to make the groups?

- Challenge children to figure out ways to measure the heaviness and size of a rock. How do they define the term light or small? Model for the children how to weigh a rock on a balance and explain why it is important to clarify the definition of what is heavy or light so others will understand. For example, they might define a heavy rock as any rock that weighs more than 10 grams, whereas a light rock would weigh 10 grams or less. To expand the discussion of what constitutes a small, medium, and large rock, suggest that students do the following activity. Take three note cards and cut a 3 cm square from the middle of the first (a rock that fits inside this square might be considered small), a 4 cm square from the second (a medium rock will slide through this), and a 5 cm square from the third (if a rock doesn't slip through this hole, it will be considered large). Explain that size descriptions should always be defined and explained in a legend on a paper or otherwise made known. Geologists call a rock that can be picked up using only your fingers a pebble. If one hand is required, geologists call it a cobble. A boulder is a rock that requires at the minimum two hands to lift.

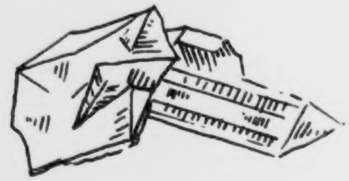
- Introduce children to the three major kinds of rock (igneous, sedimentary and metamorphic) by setting up the following demonstrations. To give children a better idea of how igneous rocks are formed, heat a pinch of sugar (which consists of carbon, hydrogen, and oxygen) in a small section of aluminum foil over a candle flame. As rocks are heated the mineral composition is rearranged just as the heated sugar crystals change from white to a bubbly golden brown to black and crusty. Explain that the word "igneous" means "made from fire or heat". Deep down in the earth it is very hot. The heat helps change nearby rocks and minerals into molten rock, called magma. As magma bubbles toward the surface, it cools and turns into rock. Pass around samples of igneous rock (granite, pumice, scoria, biotite, obsidian, basalt).

- Ask children to rub two sandstone rocks together over a piece of paper to demonstrate how a mechanical force, such as that resulting from wind and/or moving water, can break apart (erode) rocks. Create a pretend river (a paper towel tube halved lengthwise) and let a child hold it at an angle so another child can pour sand down it. The sand will run into and pile up in the bottom of a pretend lake (a clear plastic cup). Explain how rain can wash bits of eroded rock, sand, and soil into rivers and carries these sediments on into lakes or the sea and eventually they settle onto the bottom. Pour soil or another colored sand down the river, creating a story about where it is coming from (perhaps bulldozers have cleared trees to make way for a new building and a huge storm washed this "soil" into the storm drains and on into the river). Tell children that as sediments pile up under a body of water or other sediments, they are subjected to great pressures. Sediments such as sand, clay, gravel, and crushed shell fragments can be cemented together by this pressure, forming sedimentary rocks such as sandstone, shale, limestone and chalk. Another type of sedimentary rock, coal, forms from layers of decaying million year old swampy forest vegetation. The weight of the layers above gradually squeezes the water out and compresses the plant material into coal. Fossils are sometimes found in sedimentary rock. Pass around examples of sedimentary rocks such as limestone, shale, coal, sandstone, or iron ore.

- The name metamorphic means "to have been changed." Metamorphic rocks began as one kind of rock and later were changed by heat and/or pressure into another kind. Toast a marshmallow or soft candy over a candle flame and watch it change shape, color, and texture. Explain that this is similar to what happens when a sedimentary, igneous or even a prior metamorphic rock is subjected to great heat and/or pressure. A metamorphic rock may look like the original rock or it may appear quite different. Examples of metamorphic rock include slate, which develops from the sedimentary rock shale, and marble which develops from limestone. Schist and talc are other examples.

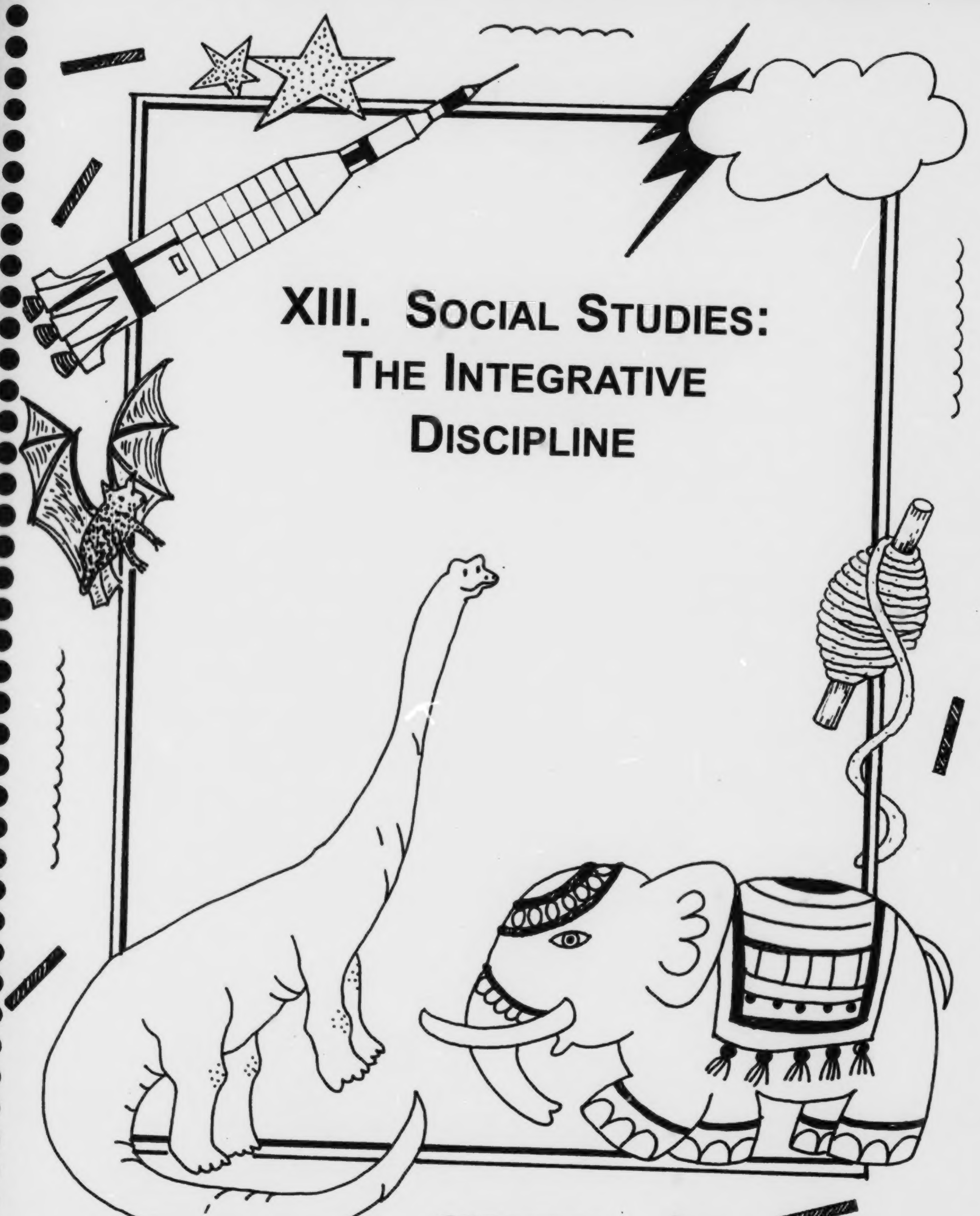
- Investigate crystal shapes by using magnifiers to examine pinches of table salt, sugar, alum (used in pickling), and Epsom salt placed on a sheet of dark construction paper. Have children look for straight edges, flat faces, and repeated shapes, and see if they can discover the common crystal shape for each sample. They will see many odd shaped fragmented and crushed pieces, but they must search for the ones with repeated, consistent patterns. What shapes are most common to each of the substances? Challenge children to draw those shapes. Explain that minerals can form special, recognizable shapes if they have enough space and are not cramped by other rocks or substances in their vicinity. Minerals that have assumed these special shapes are called crystals.

- Minerals are naturally occurring crystalline solids composed of atoms of various elements. Crystals grow as atoms arrange themselves, layer by layer, in a regular three-dimensional network. For example, table salt (sodium chloride) is formed by positively charged sodium atoms and negatively charged chloride atoms arranging themselves into cubic shapes. Children might construct a gumdrop or soft candy model of a salt crystal using four gumdrops of one color to represent the sodium atoms and four of another color to represent the chloride atoms. Twelve toothpicks will be needed to represent the magnetic forces which hold the gumdrops in position. A simple explanation of crystal growth for young children might be that atoms are the basic building blocks of rocks and everything else on earth. Just as a magnet can attract and repel another magnet, so can atoms. Tell them that one tiny crystal of salt contains billions of two kinds of atoms, sodium and chloride. Have children begin by sticking a chloride and sodium "atom" on either end of four toothpicks. Explain that sodium atoms attract chloride atoms but push away sodium atoms. Next assemble the cube in such a way that each sodium is bordered by chloride atoms. Allow children to eat their model salt crystals at the end of this class.



- Children can "grow" salt crystals by stirring one or two spoonfuls of salt into 50 ml. of water. Stop adding salt when all but a few crystals dissolve (this is called a supersaturated solution). To help children understand what is happening when the salt "disappears" in the water, demonstrate how a gumdrop salt model (described above) will come apart if it is vigorously stirred in a bowl of water. Have children place their cups of dissolved salt in a warm, dry spot and observe them without moving them over several weeks. As the water evaporates, the sodium and chloride atoms will again come into close contact and begin to arrange themselves into crystals.

- Boulders, cobbles, and pebbles are constantly being ground down into smaller fragments that are blown and washed about and redistributed as gravels and sands. Collect small bags of sand from several different locations, and encourage children to bring a plastic bag of sand back from any travels they go on. Set up a work area containing three or four containers of very different sands and the name of the place where each was collected. Have children make sand cards by dipping the center portion of a strip of scotch tape into each container and taping these sand samples onto an index card, and recording the place they came from next to each sample. Children may work individually or in small groups to write a description of their favorite sand sample. Suggest they use magnifiers to determine which sand has the most colors. Do the sand grains appear rounded and polished (worn by water) or jagged with rough edges? Are the grains similar in size? Are some grains dull, chalky, pearly, or shiny? Can they detect skeletal fragments of coral, bone, or shell? Have a member of each group place a second pinch of each sand on a index card and move a magnet underneath the card to see if there are any magnetic fragments (perhaps tiny bits of magnetite or iron ore) in the samples. Ask volunteers to read their description of one of the sand samples, being careful not to identify which sample is being described. Can other children guess which sand sample is being described? What other experiments or games can the children invent to try with sand? Can they locate the areas where the sands were collected on a map?



XIII. SOCIAL STUDIES: THE INTEGRATIVE DISCIPLINE

XIII. Social Studies: The Integrative Discipline

The relevant principle of instruction is that throughout the primary grades the curriculum should be integrated

(Lillian Katz).

Understanding Integrated Learning

Children enjoy learning and do so persistently, as long as the content of what they are learning meets their needs, purposes, and interests.

One of the most important assumptions of human development is that all areas of development—physical, social, emotional, and cognitive—are integrated. A significant goal of the Step by Step Primary Program is to address all aspects of development as a whole, rather than as fragmented components. Similarly, students' learning should be integrated during the primary years. Such an approach to teaching emphasizes the intellectual, social, emotional, physical, and aesthetic aspects of children's growth. Integrated teaching supports the simultaneous development of these areas rather than focusing on an isolated aspect which is unnatural for children's development. As stated in the National Association for the Education of Young Children (NAEYC) (Bredekamp, 1987, p. 62-63) guidelines, *It is an inappropriate practice to view children's cognitive development in fragmented content areas such as math, science, reading, social studies where specific times are scheduled to concentrate on each area.*

Often, teachers feel compelled to teach every aspect of the curriculum. There are times when educators find themselves caught between their sense of obligation to cover the school's curriculum guidelines and to explore potentially rich opportunities for learning which are initiated by the children. While recognizing that there are basic requirements to be covered in every school, innovative teaching achieves a careful balance between allowing for individual interests and ability levels and providing direction and input from the standard curriculum. Integrating subject areas is an effective method to overcome the pressure of trying to cover all the curriculum. Through the integration of subject areas and planning, teachers can address student needs and curriculum requirements. The focus needs to be on a child-centered and individualized program rather than a strongly subject-centered and teacher-directed one. Consequently, learning results from active involvement with projects, learning centers, discussions, field trips, guest speakers. Children do not necessarily benefit from learning by isolating subject areas. For example, students challenge themselves and their reading, writing, and math skills when completing science and social studies projects.

Integration of the subject areas is demonstrated by the following example:

> A collection of coins brought into the classroom by a student who had vacationed in another country, sparked a classroom-wide interest in money. The teacher observed several students comparing the foreign coins to their currency. In response to a comment made regarding the coins' weight, she provided a set of scales for the children to use to make comparisons. A world map was displayed to record the different monetary values, and an area was set aside for making rubbings of the various coins. Discussions occurred about mathematical probability relating to flipping a coin and it landing with the head or tail side up. Graphs demonstrating the outcomes were hung around the room. A study of the exchange rate in the newspaper evolved. The children produced a book titled *A Guide to Foreign Coins* and then designed their own coins. A field trip to the Federal Bureau of Printing and Engraving concluded this study.

Understanding Thematic Teaching

> *.. thematic teaching is effective because it brings together closely related material whose parts form a unified whole* (Jarolimek)

Integrating the curriculum can be successfully accomplished through a thematic approach. All the skills that children need to learn within the school setting may occur naturally in a theme study. Thematic teaching involves integrating different teaching areas by exploring an interesting idea which draws on content from various subject areas. A unified theme allows students to see the connections among different subject areas and allows the teacher to organize the curriculum around topics, problems, or essential questions that children find engaging. A thematic approach is interdisciplinary. The curriculum may be planned around themes that are selected by the teacher or by the children based on common interests.

A thematic approach:

- Provides a long range-plan for teaching
- Serves to give a group of children a common interest
- Helps develop a spirit of community
- Involves all the subject areas
- Gives relevance to the curriculum

Although most thematic unit plans are considered long term, they can be planned for varying lengths of time. Some units might be shorter if the study satisfies the children's interests. Other units may be expanded as children's interest in the topic increases.

Curriculum Webbing

Creating a curriculum web is a method for teachers to organize ideas around a theme or topic. Usually a web evolves from children's interests and questions, however, a web can be teacher initiated. Because new areas or concepts may be added by drawing lines from the center, the plan never becomes static. Webbing creates a framework for the integration of content areas and encourages students to use their own creativity, imagination, and interests to shape the curriculum. This planning process encourages linking one area to another, providing opportunities for an integrated curriculum. A web represents long-term planning and creates a framework for short-term plans.

Witches Poem

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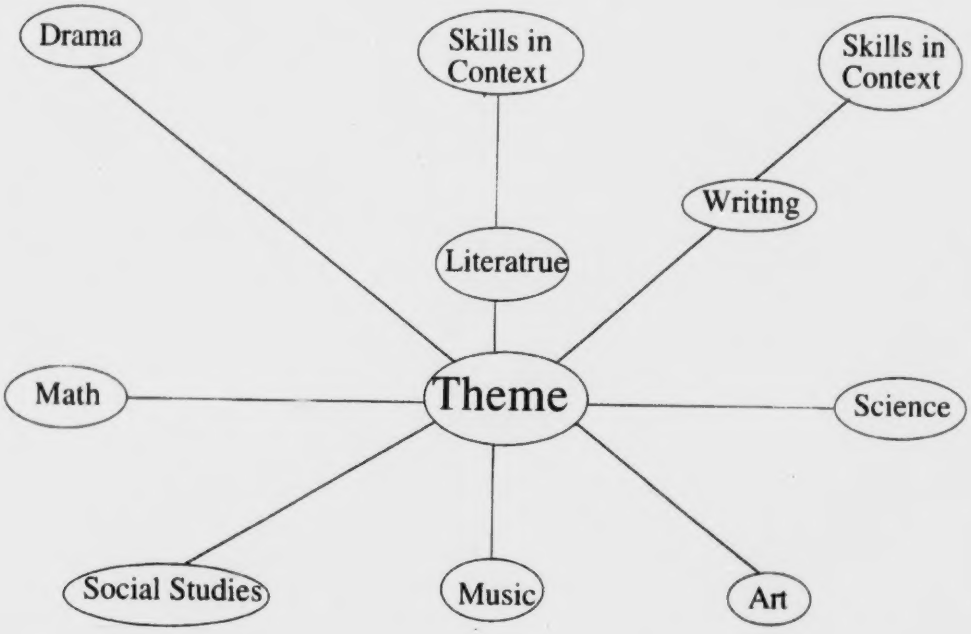
Curriculum webbing provides a format for quickly recording and oganizing a lot of information in a clear and concise fashion. Webs help the teacher create a coherent and purposeful curriculum, which may loosely follow a school's formal curriculum guidelines while building on the children's previous learning experiences.

Webbing provides opportunities to achieve a balance between allowing children to pursue their own interests and needs, and building on their experiences.

Curriculum webs may also be used to communicate to parents and other school personnel what has been occurring in a classroom. This allows all to see the wide variety of experiences offered in a unit of study.

Webbing can help the teacher and children map out connections. By going through the webbing process, a teacher can connect short-term goals to long-term ones, children's interests to their needs, and prior learning experiences to new experiences.

Webbing a theme allows the teacher to think freely about what might be studied and which activities could be included. Through webbing teachers can make relationships between subject areas which they might not have previously recognized.



Planning a Thematic Unit

Topic

Deciding on a topic is the first step in thematic unit planning. Selection of the unit topic should be based on general goals of the curriculum and the interests, needs, and experiences of the children, as well as available resources that help support the learning. Ensuring that the topic is developmentally appropriate is necessary. Bear in mind the most abstract themes or concepts may lend themselves more readily to a thematic approach, as they allow for greater flexibility and encourage more diverse thought processes.

Once a topic has been decided upon, the teacher and students should create a web by brainstorming ideas related to the topic. Starting with the theme in the center, the teacher should record the children's responses onto the web, arranging them according to common traits.

To create a web:

- Determine the theme to be explored.
- Write the theme in the middle of chart paper or the chalkboard.
- Involve students in a brainstorming session as they offer words related to the theme.
- Record the words given and connect them to the theme; attempt to arrange words under appropriate headings.
- Arrange and rearrange words until the web reflects all possible ideas.
- Copy the web onto a chart and display it so students can refer to it from time to time.

(Rothlein & Meinbach, 1991)

Objectives

Objectives guide a thematic unit. They focus on what the unit hopes to achieve, state the skills the children will acquire, and document how assessment of the unit will occur. Choosing a few specific objectives to accomplish is often more effective than a long list of general goals. When creating unit objectives, it is important to achieve an integrated balance of the subject areas.

Sequencing the Unit

Using the curriculum web, the teacher organizes and documents the sequence of concepts to be covered and lists appropriate activities, resources, field trips, speakers for each area. Careful consideration needs to be given to the sequencing of lessons so that the learning builds on the children's prior knowledge and is age appropriate.

Learning Activities

The learning activities are the core of an integrated unit. With the unit objectives in mind, the teacher should plan appropriate learning activities. Learning experiences should not be viewed in isolation. The purpose of a unit is to develop a strong relationship between activities and the content areas.

Suggested learning activities:

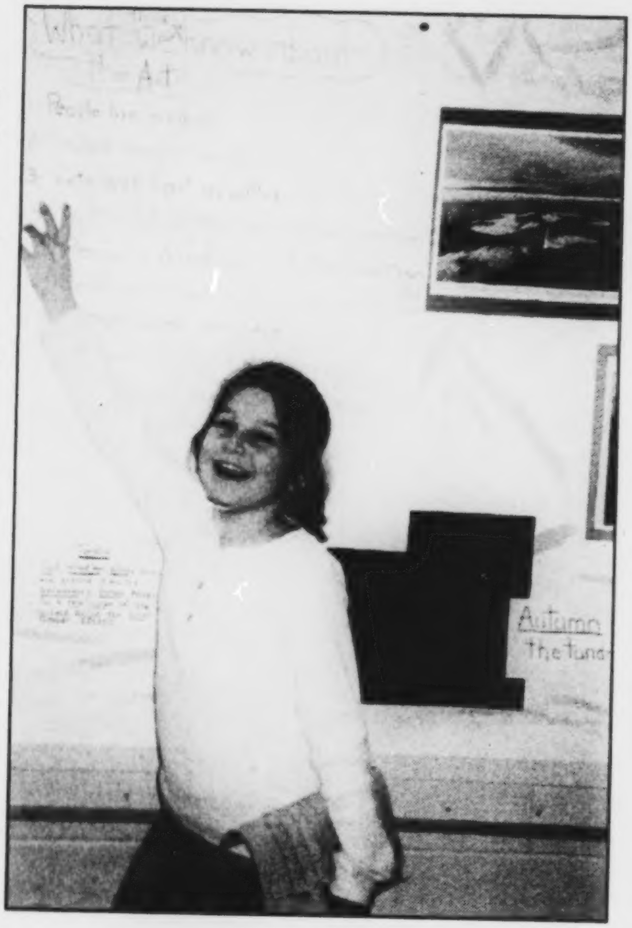
- Literacy—writing activities, oral discussions, reading, drama, reporting to a group, poetry
- Mathematics—measure, weigh, count, add, classify, graph
- Science—observation, hypothesis, experiment, recording
- Community—field trips, speakers, parents
- Audio-Visual—films, videos, slides, models, computers, murals
- Arts & Crafts—drawing, painting, constructing, modeling with clay, collage
- Music—songs, games, playing musical instruments, creating rhythms

- Physical—games, dancing, drama
- Social—cooperative learning, group discussions, group projects

(Adapted from Seefeldt, 1984)

Evaluation

Evaluation is a crucial part of planning and teaching a thematic unit. The specific objectives created at the beginning of the unit serve as a measuring tool for evaluation. Mastery of these objectives will determine student progress. Informal evaluations can be performed by the teacher through observations, anecdotal records, and checklists. Student evaluation provides valuable information and reflects upon the success of the unit. Student response also assists the teacher with future unit planning. Requesting the students to evaluate a thematic unit can be done through a series of questions:



- What did you learn?
- What can you do now that you couldn't do before?
- What did you like best about the topic?
- What are your best portfolio pieces?
- What changes would you make?

(Adapted from Seefeldt, 1984)

Not only should the students' learning be assessed, but the effectiveness of the planning and teaching by the teacher should be addressed. A well-planned unit should include:

- Clear, realistic, attainable goals and objectives
- Materials of high interest to the student
- Activities that provide for different abilities, interests, and experiences
- Involvement of the students in planning the thematic unit
- Active experiences that fully involve the children
- Opportunities for students to work and play together

Steps In Planning a Thematic Study

1. Select an appropriate topic.

2. Develop ideas for the content of the study project.

3. Become familiar with the subject.

4. Decide on how to address curriculum objectives.

5. Inform families about the topic and ask them for their participation and contributions.

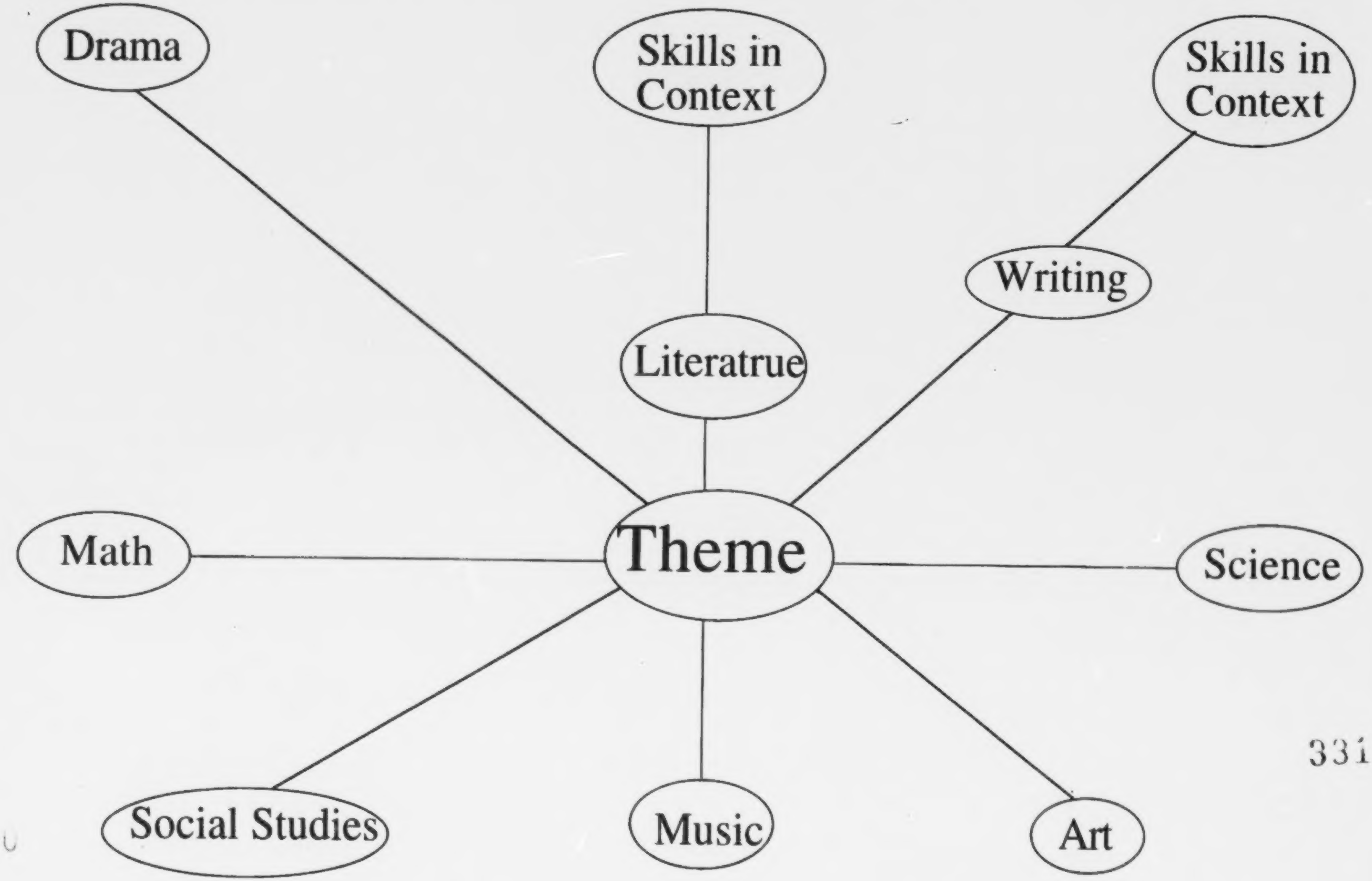
6. Begin collecting material related to the topic.

7. Plan experiences that will help children become knowledgeable about the topic.

8. Introduce the study topic to the children.

9. Listen to and learn with the children.

10. Think about concluding the study by assessing for student understanding.



Theme

Drama

Skills in Context

Literatrue

Skills in Context

Writing

Math

Science

Social Studies

Music

Art

Parent Involvement

Involve parents in your thematic study by sending home a letter. Activities that are easy to do will foster student learning and school/home communication. Below is a sample letter describing the current theme of study with specific activities for parents to do with their child.

Dear Parents,

We are studying weather at school. Here are some enjoyable weather activities you can do at home with your child.

1. Read library books about weather. Talk about your favorite parts of the book.
2. Cut out pictures from magazines that illustrate different types of weather. Glue them on cardboard to make a collage.
3. Be a weather detective. Look for changes that occur before, during, and after a storm.
4. If you have an outdoor thermometer, record the temperature at different times of the day. Discuss how it changes.
5. Go for a walk. Talk about the different clouds you see and the weather you think they may bring.
6. Tell your child about a storm experience that you remember.
7. Watch the weather report on television and read it in a newspaper.
8. Record the daily weather on a calendar. Look for patterns in the weather. Try to predict what the weather will be like the next day, week, month.
9. Ask your child where people go to take a vacation when they want to snow ski, to relax on the beach.
10. Help your child interview older family members or friends who remember weather disasters or extreme conditions.

Thematic Units of Study:

India

Weather

Wool

Bats

Dinosaurs

Space

The thematic units of study for India, Weather, and Wool are described in depth so that teachers can get a complete idea of how to use a theme in an integrated way. These units include Sample Lesson Plans to serve as a model for creating units in response to students' interests.

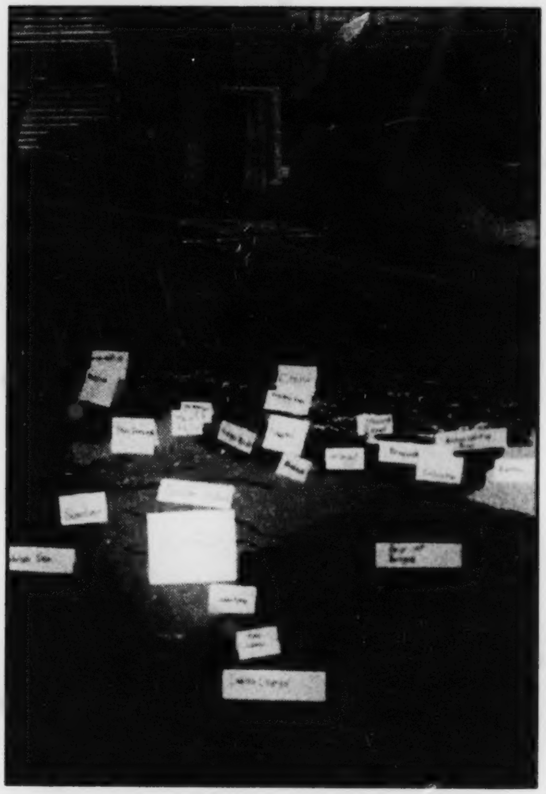
The thematic unit of Bats gives a series of activities within each content area that could form a basis for integrated learning in this interest area. Teachers are urged to create sample lesson plans as practice for developing integrated learning. Dinosaurs and Space units are displayed in web form. As further exercise, teachers can work together to practice developing activities for each content area and sample lesson plans.

Thematic Unit of Study: India

Choosing another culture for children to study is a way to help children understand that people are different and that differences in others should be appreciated. As the world becomes more closely connected, children should feel comfortable with those who are different than they are. The culture that a classroom studies may be determined by the composition of the class (i.e., children whose families come from different cultures), or a particular interest of the teacher or children. Although many of the experiences cannot be firsthand (traveling to the country being studied), speakers from the country can be brought in, and communication with children in the country being studied can usually be arranged through a pen pal connection. A thematic unit of study such as India allows for many discussions as the children listen to factual information about the country as well as folk tales and literature. Curriculum content areas can be connected as the children study a culture in depth.

The physical environment of the classroom should reflect this study of India. Photographs of the people, architecture and animals of India can be displayed. Of course any map, mural or model that the children have created should be a central focus in the classroom. A collection of items made in India can make a "museum" that children should feel free to touch and explore.

The main idea of a unit such as this is to have the children compare their lifestyles with another culture. The study of families and the way that they live is a wonderful focus as children begin. Many children's books and films can be obtained that describe families in other cultures. The children will learn about the roles of mothers, fathers, and children and compare them with their own experiences. Children will study the homes of India and life in villages and cities. Children will look at the clothes that are worn (actual clothes should be obtained if possible) and compared with their own. Children will learn mapping skills and terminology as they create a topographical map.



Language and literacy is connected throughout the study of India as children read about India and listen to stories and facts about India as well. They should be encouraged to write poems and stories about the country, too.

Science is easily integrated in the theme of India as children learn about geographical terms such as *desert* and *rainforest*. The children can create dioramas of deserts and learn about the animals that live in the deserts and other geographical areas. The river and mountain environments will also be studied. The weather of India is fascinating to children as they learn about monsoons and how they affect the lives of those in India. Cooking is a wonderful way for children to both investigate another culture and also to learn about science as they create interesting Indian recipies.

Math is taught as children make models of Indian homes and map out models of villages and cities. Parcheesi, an Indian game, can be played and the children can make their own Parcheesi boards. Discussing the length of the Ganges River and the height of the tallest peak in the Himalayas is a way of incorporating math into the curriculum as well.

Art is certainly an integral part of this thematic unit. The children can paint murals depicting life in India and create models of villages and cities in India. Art of India can also be discussed. Of particular interest to young children are the "painted prayers" that are common to village life in India. Painted prayer can be "painted" on a model of a village as well as "painted" on mural paper.

Music and movement are connected to a cultural study as children listen to the music native to the culture they are studying (in this case India). As dance is a major segment of Indian society, children can observe others dancing (through films and guest visits) and try some of the movement themselves.

The theme of India (or any culture) encourages children to learn about a country in depth. Children learn not just isolated facts about an area of the world, but truly investigate how another society lives. Children see what they have in common with another culture as well as what is different. They can begin to understand and appreciate differences in others. This appreciation will better prepare them to live in a global society.

Overview: The Craft and Art Traditions of India

India is a country rich in art and craft traditions. The widely diverse forms and many objects produced by Indian artisans reflect a creative process that has been flourishing for some 5,000 years. Today these traditions continue to play a prominent role in the everyday life of India. Each region of the country has its own unique tribal and folk forms. These forms can vary from village to village, but they all share a common heritage of myths and symbols.

From the earliest times, the Indian artist has focused on the problems of vision and creativity. What made an art object? The shape, the proportion and the color of any object must all be considered as an integrated whole. Over the ages, the Indian artisan has developed a natural understanding of the artistic process. There is no sharp distinction between art and craft. The Sanskrit word *shilpa* refers to all forms of creative expression including skill, craft, a work of art or architecture, design, ritual, ability and ingenuity.

The function of arts and crafts in providing a livelihood is often exceeded by their important roles in seasonal festivals and major ritual events such as birth, initiation, marriage, and death. Indeed, an object that originally is intended to be purely decorative may later become an offering in a ritual.

Indian craft workers excel in metalwork, jewelry making and in sculpting forms in wood, stone and ivory. There are also strong craft traditions in lacquer work, printed and embroidered textiles, basketry, pottery, toy making (dolls, puppets, masks) and folk painting. The Indian artisan has excelled in virtually every craft medium.

Visitors to India come away with a new respect for the creativity they encounter. This is a country of colorful diversity where art is an intrinsic part of everyday life.

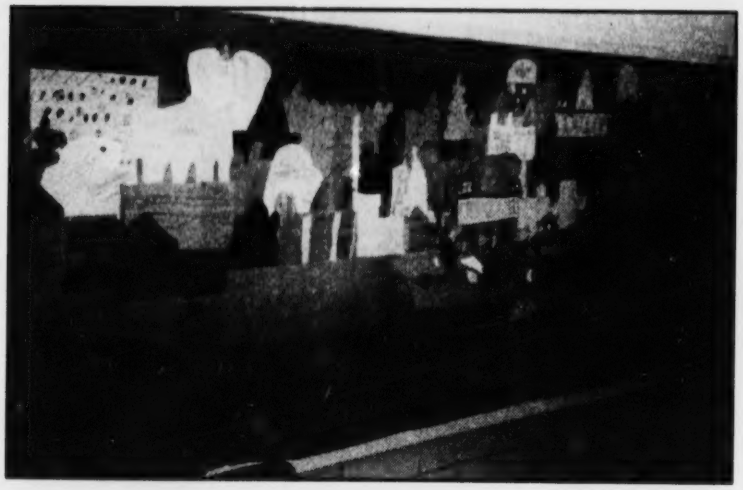
Architecture: India

India's architecture mirrors its long and varied history. Indian homes evolved in response to specific functional and ceremonial requirements. Public buildings such as temples reflect the diversity of religions throughout India.

Rich merchants and other business people often live in exquisite stone mansions called *havelis*. The less wealthy live in densely populated neighborhoods, with private living spaces grouped around shaded courtyards. These courtyards are often gardens filled with shade trees and many flowering plants.

Another type of dwelling is a one-story house called a bungalow. Bungalows often have porches or verandahs that protect their inhabitants from the sun and rain and also serve as places for relaxing with visitors or meeting with tradespeople. The word *bungalow* has its origin in a Bengali word for hut, *bangala*.

Bungas or round huts have been built in the same way for centuries. The round mud shape is raised on a mud platform that protects it from high water during the monsoon season. The walls of such huts are adorned with textiles and colored geometric patterns. The roofs are conical and made from bamboo. The main living space is three to five meters in



diameter.

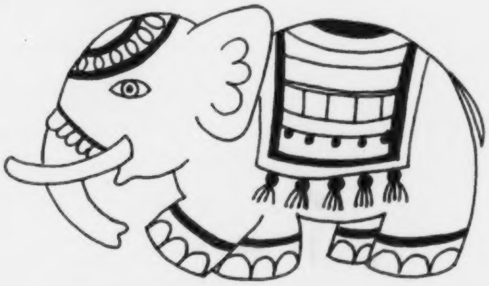
In southern India, the palm tree is used as building material. It is not unusual to see a two-room house made from woven palm branches. Such houses have a basket-like look. They are usually rectangular in shape (a characteristic common to village houses throughout India). Many have clay tiled roofs.

On the outskirts of many cities or in the cities themselves are beautiful palaces built by Indian royalty. Some are still occupied. These palaces were very elaborate, with colorful decor. They often reflected European and British architectural influences. Some were actually built to resemble castles. Wood carving and elaborate stone work in the palaces display extraordinary craftsmanship by Indian artisans.

There are many religious sites in India which have elaborate buildings called temples. They reflect the religious diversity of India over the centuries. Many of these temples are famous throughout the world and are thronged with tourists.

The most famous building in India is the Taj Mahal that is located in Agra. It is a mausoleum or tomb that was built by a mogul shah in memory of his wife. It is constructed of white marble with tall, narrow minarets at each corner of a raised platform. The huge dome which soars over the main structure is surrounded by four smaller domes. This magnificent structure is considered to be one of the architectural wonders of the world. Enormous numbers of visitors come each year to marvel over the Taj Mahal's beautiful setting, proportions and delicate inlaid stone work.

India's modern architecture shows the influence of Western cultures. Before India won its independence, architects designed buildings that combined Indian decoration and European forms. Today's architecture reflects efforts to combine local and historical traditions with modern technology.



Sample Lesson Plan: Constructing an Indian Village (Northern India, Rajasthan)

This village is located in the dry landscape of Rajasthan in northern India. The small complex of homes and buildings is constructed from a mixture of mud, wood, and cow dung. All of these materials are found within the immediate environment.

The land is hot and dry during the summer. Temperatures reach 116 to 118 degrees Fahrenheit. During the winter, it is very cold, but there is no snow because the region is so dry. Snow falls only in mountainous areas.

Families keep goats, perhaps a camel, one or two cows and a buffalo. The buffalo not only provides milk but also is a beast of burden. Buffalo and cow dung is used as fuel for cooking. Families grow such crops as millet and lentils during the fertile season following the monsoon rains.

A village well provides families with fresh water. Earthen pots made by a village potter are used to store grain to carry and store water. Brass pots are also often used.

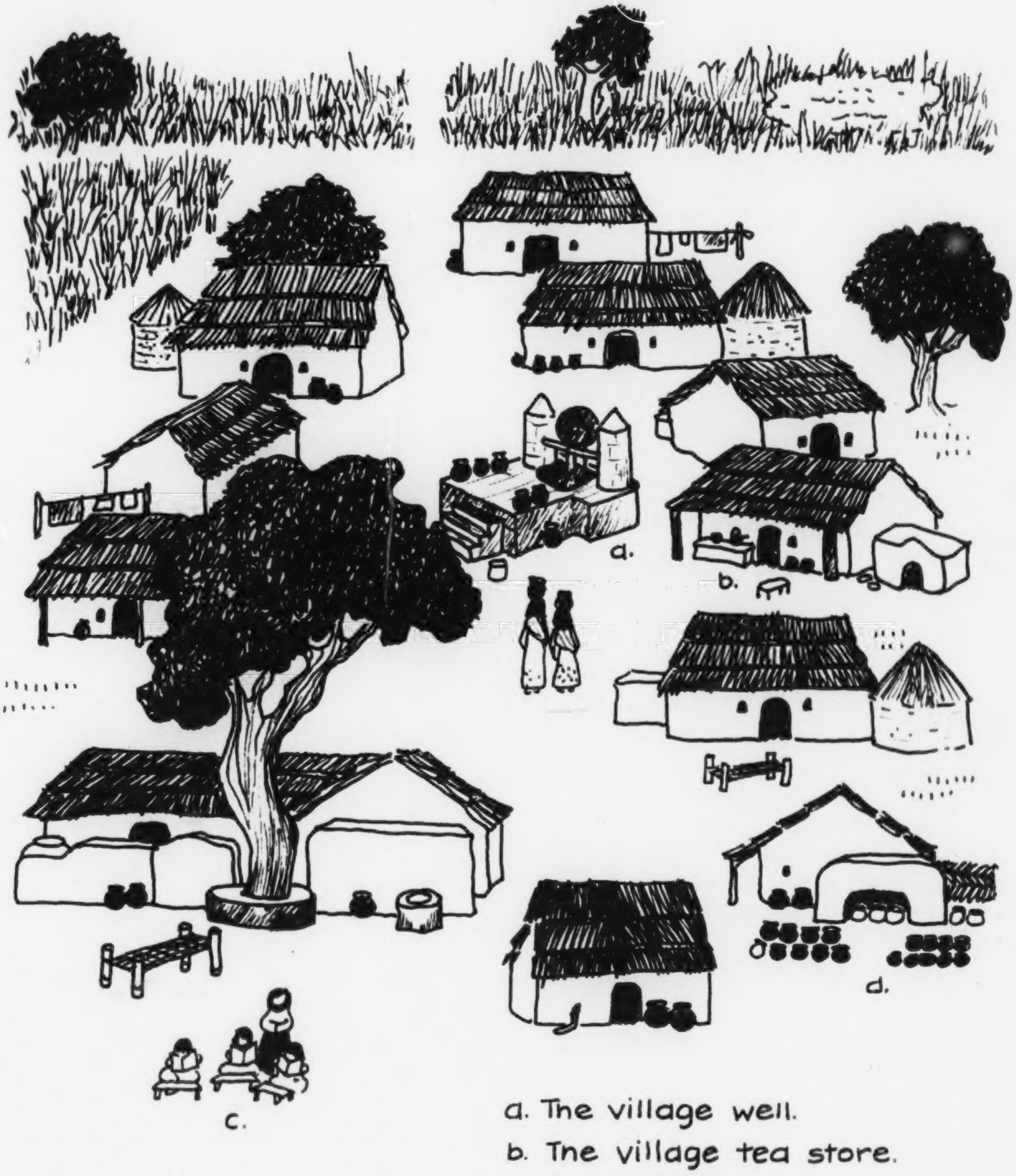
The thatched-roof, one-room houses are made from wood and mud. One house provides shelter for a whole family. Even the buffalo lives in the house like a member of the family. All cooking is done outside on a *chula*. The mud walls of the house are re-plastered each year at festival times.

Children attend school together in a common open space in the village. They have only slates on which to write. When children are not helping their families, they make their own toys, often using pebbles and marbles. Two popular games are called *seven tiles* and *guilidandi*.

The men of the village go out in the fields at sunrise. During harvest time, women also work in the fields. While boys go to school, girls often stop attending to look after younger brothers and sisters. In cities, however, girls often attend high school and many go on to colleges and universities.

Many villages do not yet have a post office or a telephone. Streets are unplanned. Village activities are held around a large tree that shades a special area. The village well is the hub of activity at the beginning of each day. It is where the women of the village exchange information and help each other with their daily tasks.

An Indian village in Rajasthan, North India



a. The village well.
b. The village tea store.
c. The school.
d. The village pottery.

Objectives

Through this activity, students will:

- Learn about family life in an Indian desert village.
- Learn how families utilize materials found in their environment to build their homes and create objects utilized in their everyday lives.
- Learn about Indian customs, foods, and costumes.

Materials

- Large wooden board on which to build a village
- Clay, terra cotta color, for house construction
- Twigs and pine needles for roofs
- String
- Small pebbles, stones
- Sand
- Bright scraps of cloth for costumes
- Paint (tempura/poster) white, blue (water), brown

Procedure

1) Determine where the model village will be placed in the classroom. If possible, it should be located on a large table where children have access to all sides of the model. Because the project will be worked on for a considerable time, it is better if it is not moved too often.

2) Children decide where the houses, the well and the fields will be placed.

3) Create a landscape using dirt, sand, and small stones. A little glue will help keep stones in place (not the dirt). The soil should be light in color since the village is in a desert area. (Refer to the illustration of a village.)

4) Build mud huts and other buildings after the landscape is in place. Trees can be added (there are not many).

5) Add small details—clay pottery, benches, beds, tiny candles in apertures (niches), animals, and people. Children can make people from clay or from putting tiny sticks together to make doll-like forms. The clay or stick figures are clothed with colorful scraps of fabric.

6) Encourage children to always keep scale and size in mind. Houses should not be too small in relation to the people.

7) Urge children to be on the lookout for materials that can make their village look more authentic.

Assessment

Because this project extends over a period of time, it is important that the children not lose interest. A great deal of learning can result from the study of another culture and from developing an awareness of other peoples.

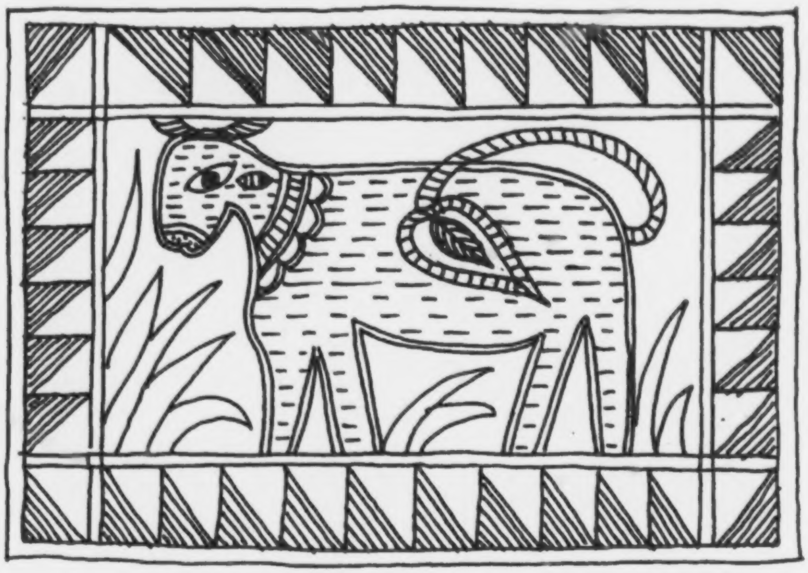
Time

One month—if a period is set aside each week for this activity.

Sample Art Lesson: Mithila Paintings and Drawings

For nearly 3,000, years the women of Mithila in the state of Bihar have been making striking paintings on the mud walls of their homes. The paintings are not merely decorative. They mark important occasions in the lives of their creators and their families weddings, births, family ceremonies, and religious festivals. The paintings, called *kobhar*, are done in vivid colors (ink form) using a kind of brush made from a bamboo stick. A small piece of cotton is attached to one end of the stick which is then dipped in the colored ink. At one time, only natural pigments were used. The color black came from soot, red from a local clay, and yellow from the pollen of a flower. Both the painted forms and the choice of colors were symbolic.

Today this tradition of wall painting has grown to include drawings on handmade paper. Mithila artists are using pen and ink and are adding colored ink to highlight their intricate drawings. A border design is usually painted around the edge of each ink drawing. Eyes of both animals and people are always drawn in the same way, regardless of the position of their bodies.



Objectives

Through this art activity, students will:

- Learn about a folk art that has been practiced in India for 3,000 years.
- Discover similarities between their own folk art painting and that of India.

Example: using a brush made from a piece of cotton tied to the end of a stick for drawing and painting.

Materials

- Black ink; also some colored inks such as yellow, red, or orange
- Pen
- Stick-brushes—sticks with wads of cotton attached at one end
- White drawing paper
- Scrap paper to experiment with drawing ideas

Procedure

1. Encourage children to observe this form of folk art painting and drawing. These artists created highly skilled drawings, often using animals or birds as motifs.
2. Talk about the shapes of animals that exist in India and how to divide the shape into separate forms so they are easier to draw. The children can then draw ones that interest them.
3. Have children sketch first on a piece of paper, then lightly pencil in the drawing. When they are happy with their completed drawings, they may ink them in.
4. Remind the children to draw a border around their art work. Also, the "special eye" style of the animals will make their work look more authentic.

Assessment

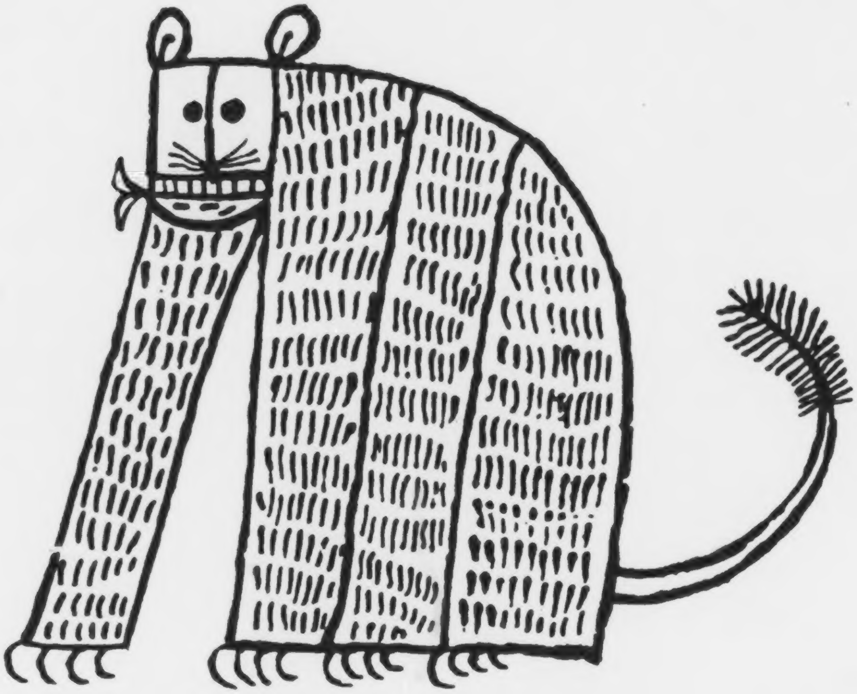
In doing this style of drawing, the children should keep in mind the use of symbols and the fact that this type of artwork first appeared on the walls of Indian village homes. It is important that they try to relate this ancient artistic custom to their own folk art traditions.

Time

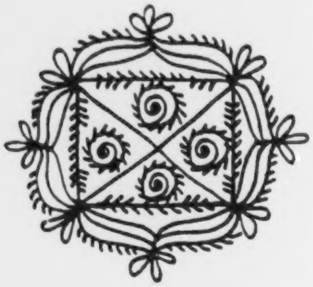
Two 45-minute periods.

Resources

If pictures of Mithila paintings and drawings are not available, use photographs of animals that are found in India: tigers, lions, elephants, and birds such as the peacock.



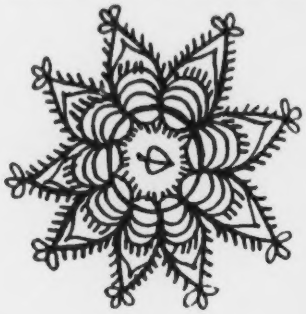
Sample Lesson Plan: The Art of Floor Decoration



Floor decorations in India originated as a form and expression of thanksgiving. From one generation to another, young women learn the art of pouring rice flour onto the earthen floor for decoration. This ritual is performed by letting the rice flour slip between the fingers of the right hand on to the freshly swept earthen floor surface. Only the women of the family practice this art form. A girl learns it from her mother when she is perhaps five years of age. By the time she is 13 years old, she is an expert. Usually these floor decorations are drawn near the threshold of the home or in and around the courtyard. Sometimes an entire floor is covered by a decoration, spread out like a carpet.

There is the belief in the Hindu religion that many problems and misfortunes are caused by evil and malevolent spirits. People believe that they can protect their homes through the ritual of decorating the floors and walls. By beautifying the home with paintings and mud-relief sculptures, malice is overcome. These designs are a protection against evil. They celebrate the deities that protect the home.

The walls and floors of most rural Indian homes are made of a mixture of mud and animal dung. The building material is easily available and affordable but requires constant attention. The women of the household spread a new layer of mud and dung by hand, scooping up the mixture with their hands and smoothing it over the cracked surfaces.



Most decorative drawings are daubed, sprayed, or trickled on by hand on the floor—without the aid of implements or tools. White is the predominant color. It is made from rice which is soaked overnight in water and then ground into a paste or powder. Sometimes the coloring material comes from locally excavated chalk or white lime. Red, yellow, and green are also used. Black coloring is made from coal dust or burnt coconut shells. In recent years, some of the decorations are being done with commercial paints such as acrylics.

A common word for this type of floor decoration is *kolam*, which means *to write*. But each region in India also has its own name for this custom. The folk art tradition of floor painting has become renowned. The tradition of wall decoration is also very much part of this tradition and is done using techniques similar to those used in decorating floors.

Objectives

Through this activity, the children will:

- Learn about a folk art tradition that is practiced throughout India.
- Observe that many of the line designs and symbols resemble those folk art patterns in their own countries.

Materials

- White tempera/poster paint—not too thin
- Brushes—small
- Earth-colored construction paper (black paper may be used)
- Practice paper
- Pencils

Procedures

1. Ask children to observe sample designs and decide where a good starting point for their designs might be.
2. First draw the design with a pencil.
3. Using a brush, paint over the pencil lines tracing the design.

Assessment

Children should be encouraged to think about the symbolism embodied in the design. How does this folk art relate to their own folk art traditions?

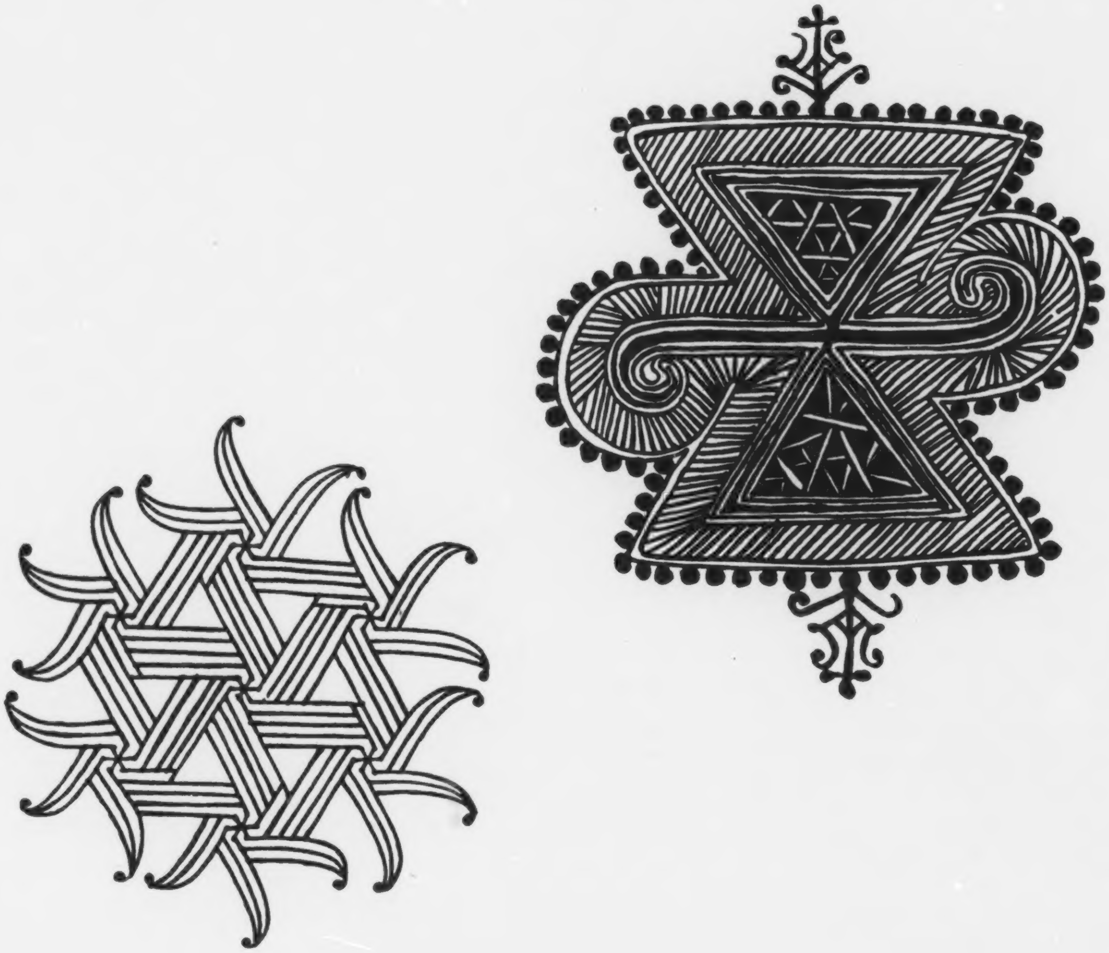
Additional Activities

- The children may paint a design to go by their own doorways.

- They can make a miniature mud house and create a design in front.
- They can make a miniature courtyard where they can paint a design.

Time

Two 45-minute periods if the design is large and complex.



Floor Decorations

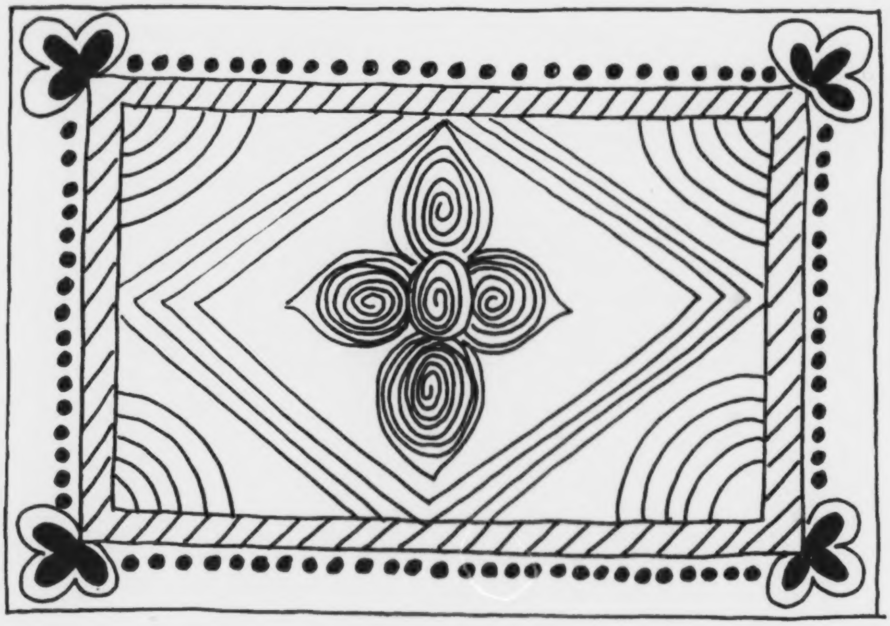
Sample Lesson Plan: Embroidery Cloth

Embroidery is the art of working raised designs (using a needle) in threads of silk, cotton, gold, or silver upon the surface of woven cloth. Embroidery has been practiced in India for ages. Indeed, embroidery has long been used by Indians in their daily lives to furnish their homes and decorate their garments. Fine work is valued. In the past, people would trade a prized possession such as a goat for a particularly excellent piece.

The art of embroidery is practiced with colorful skill by women and young girls in various regions of India. They embroider clothes and decorations primarily for their own use and pleasure. They share embroidery patterns within their communities and express themselves by using carefully chosen color schemes.

The different embroidery styles of various regions are so distinctive that knowledgeable people can tell immediately where a particular work originated. Changes in regional styles evolve through marriage. When a bride moves to a new community, she brings with her a dowry that represents the skills in her native village.

Indian embroidery work is distinguished by the colorful use of threads, buttons, beads, and mirror work. Red is often the dominant color. Yellow and blacks are also prominent. Stem, feather, and chain stitches are most commonly used in these decorative works of art.



Objectives

Through this art activity, children will:

- Learn that stitching patterns in embroidery work are often similar, regardless of country. Ideas and styles have been exchanged over the centuries.
- Develop their own sewing or embroidery skills.

Materials

- White paper on which to sketch design
- Needles
- Colorful threads—white, yellow, black, green, blue
- Scissors
- Chalk for drawing design on cloth (pencil can be used)
- Cloth—cotton with threads (weaving) that are easy to stitch in and out. Red is a good choice. Also, cloth to practice stitching
- Beads/buttons

Procedure

1) Ask children to draw a decorative design on sketch paper. This paper should be the same size as the cloth for the embroidery. A square shape works well. Note: illustrations.

2) Have them draw the design with chalk or pencil on the cloth.

3) Demonstrate different kinds of stitches: chain, running, stem, and perhaps feather. Some children will already know some of the stitches, so perhaps they can help classmates.

4) Encourage the children to work on their embroidery when they have practiced their stitches a bit.

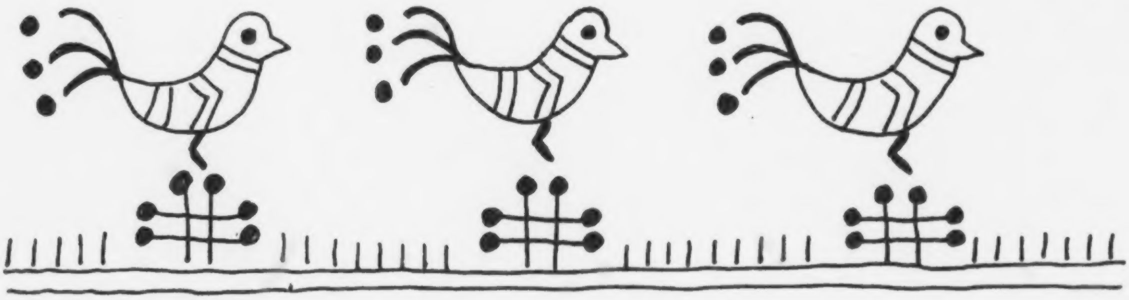
5) This craft process will take some time. Allow children to pick up their work when other classroom tasks are completed or when they have free time.

Assessment

It is important that the children do not see "sewing" as a girl's activity. Today in India many of the most skilled textile workers are men. Men have become famous rug weavers. Displaying these embroidered works of art can be very satisfying. It will highlight a new interest in this tradition.

Resources

Show the children, if possible, real embroidery from India. If Indian embroidery is not available, show them embroidery work from other places so they can see how motifs and symbols are used.



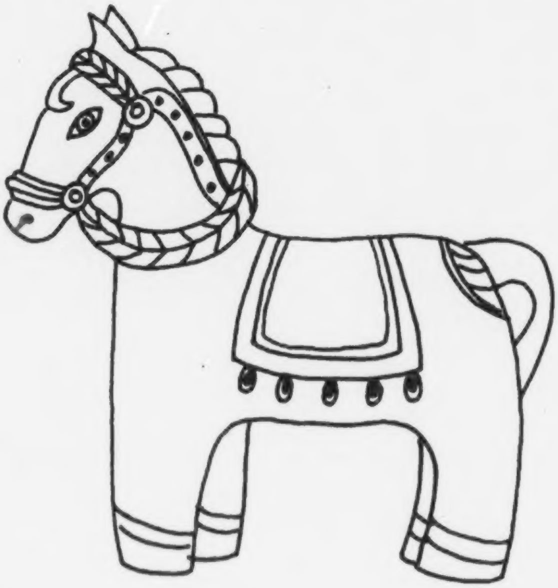
Sample Lesson Plan: Terra Cotta Animals

Clay plays a fundamental role in Indian civilization. All creation is derived from the earth. And clay is a basic element of society, especially in rural India where homes are made of clay. Clay vessels are used for storage, cooking and eating. Clay sculptures such as horses and elephants are devotional offerings.

The craftsmen who create these forms in clay and purify them in fire are a specialized group (a caste). They are called *Kumbhars*, or potters. Over one million potters work in India creating vessels and sculptures which are an important part of the lives of Indian people.

The shapes, decorations, number, and use of terra cottas differ in each community and even in various areas of individual communities. Function and style are interrelated. An object's ornamentation is integral to its use. For example, most Indian points have wide, rounded bases which narrow to outward turned openings. The wide base enables the pot to be easily carried on the head.

The clay used in making these objects is gathered from ponds and river beds. The first stage involves pounding the clay and then removing impurities such as twigs, gravel, and small pebbles. A variety of materials may be mixed with the clay along with water: sand, rice husks, ashes, cow dung, or cotton wool. Such materials are added to prevent the clay from cracking when it is sun-dried and fired in the kiln. Both hands and feet are used to blend the clay into a dough-like mixture, taking care to make sure the clay is not exposed to the sun and is kept moist under a covering of jute or plastic. After the clay object is formed, it is fired in a simple kiln.



Operating the potter's wheel is considered man's work in India. Both men and women share in shaping and preparing the surface of vessels after they have been removed from the potter's wheel. Women may also make pots using molds and the coil technique. These water vessels are often painted with designs incorporating geometric lines, flower petals, or birds. Designs differ from southern to northern India.

The techniques of sculpting terra cotta animal forms are also varied. The Jhabna district in Gujarat, for example, has a tradition of offering terra cotta figurines or animals to the gods and spirits. This offering is to protect a child and bring prosperity.

In the usual modeling technique used by potter, the main body of the figurine or animal is wheel turned, very much like an elongated jar. The technique is used to form the tube-like limbs and curiously shaped heads. The rest of the embellishments are hand-modeled, using considerable creative license.

Objectives

Through these art activities, the children will:

- Learn about Indian clay sculpture.
- Learn why and how Indian potters make these animal clay sculptures.

Materials

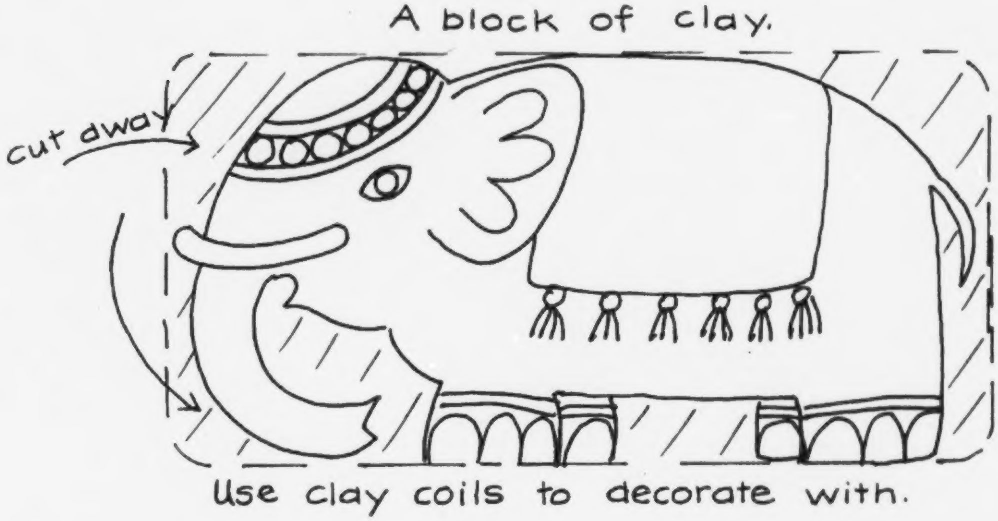
- Terra cotta clay (red) moist
- Small wooden or plastic tools for detail work
- Working surface: the surface for modeling clay work should not be varnished or painted. The clay will stick to such surfaces. Use a small piece of canvas cloth, a wooden unvarnished/natural board or a heavy piece of paper on such a surface.

Procedure

1. Provide children with their own individual working surface and tools with which to work.
2. Break the process into steps to make the individual forms which will be assembled to form a clay horse or elephant. (Note: illustration for making traditional Indian horse and elephant is included here.)

3. Another way of making these animal sculptures would be to start with a block of clay. Cut away clay to form the body of the animal and the legs. Then add the details.

4. Let the clay sculptures dry for a week. These sculptures were not painted or glazed. They were left in their natural terra cotta earth color.


A block of clay.
cut away
Use clay coils to decorate with.

Assessment

Children will have learned how to sculpt animal forms.

Time

Allow one hour for this lesson. It is better to have children complete their clay forms during one art period because of the drying process. If the figures are not completed they would have to be wrapped and kept moist until the next period.

Extensions for an Integrated Unit of Study on India

SOCIAL STUDIES:

Make a topographical map
Discuss geographical terms (general and relevant to India—i.e., desert—Thar Desert)
Learn about: origins of Rroma culture in India
    family life
    holidays
    foods (cooking)
    communication
    clothing
    architecture
    village life (markets)
    city life
    schools of young children

Prepare native foods

SCIENCE:

Study famous scientists and inventors from India
Create models of irrigation or farming systems
Try growing a crop native to India
Learn about the variety of weather in different regions in India

MATHEMATICS:

Design a model of a structure (village, city)
Play Parcheesi
Learn numbers in Hindi
Discuss length of rivers and heights of mountains

LITERACY:

Read factual books, fiction, and folktales
Write stories and poetry
Write letters to pen-pals

ART:

Paint murals depicting life in India
Create models depicting life in India
Batik fabric
Experiment with painted prayers

MUSIC AND MOVEMENT:

Listen to Indian music
Learn an Indian dance
Dramatize folktales

Thematic Unit of Study: Weather

Why Weather?

Very often a theme for a unit of study may be determined by the school's curriculum; ideally, children's interest are also an important source for deciding upon a topic. In the following thematic unit of study on weather, the topic originated due to an electrical storm that occurred during the school day. The sky turned very black and the thunder boomed. A loss of electricity interrupted the lesson being taught and the children focused solely on what was going on outside the classroom window. Building on the natural curiosity of the child is one of the teacher's primary jobs. Therefore, the teacher chose to capitalize on weather as a unit of study.

Weather

All children are familiar with weather. Weather dictates so much of what children can do and what they wear. Weather has an impact on their everyday lives.

It is possible to use weather to integrate the curriculum areas. For example, mathematical concepts can be taught by reading temperatures, graphing rainfall, estimating precipitation. Children learn science through exploration of weather instruments, testing wind direction, conducting experiments, exploring cause and effect relationships. Writing and reading occur through use of weather journals, weather reports, poems, telling weather riddles, performing broadcasts. Weather is taught as a global issue. Weather differences in the northern and southern hemispheres are explored and discussed. Seasonal changes and the impact on people's lives throughout the world are studied. Maps are studied, drawn, and displayed. Additionally, children learn about the jobs of those involved in predicting and forecasting the weather. Field trips can be taken to a weather broadcasting station, a meteorologist's office, the local park to analyze weather conditions. Visitors may include someone in the community who has experienced adverse weather conditions or a parent who has traveled to another area of the world which experiences contrasting weather conditions.

The classroom takes on the feel of the weather theme with examples of children's weather-related work displayed around the room. The class library is supplemented with relevant fiction and non-fiction books about various weather. A corner of the classroom becomes a broadcasting weather station, while the dress-up area is supplied with clothing for different seasons. Weather instruments such as thermometers, barometers, and rain gauges are displayed in both the math and science areas of the room, along with weather logs, maps, and graphs. The writing center displays vocabulary lists related to weather to encourage children to talk and think about weather. Art projects include paintings, murals, leaf rubbings, and shadow prints. These make a creative display for bulletin boards.

A group activity to conclude the weather unit is an excellent tool to assess progress and encourage cooperative learning. It provides the children with the opportunity to share their ideas and the knowledge they have gained. Some ideas for group projects:

- A collection of weather stories written by children is compiled into a class book that is shared with other classes and later displayed in the school library.
- A play is written by the students to be performed for the school.
- The children create a fashion show depicting various weather/seasonal clothing. A student-written narration accompanies the show.
- Daily weather is broadcast throughout the school by the students.

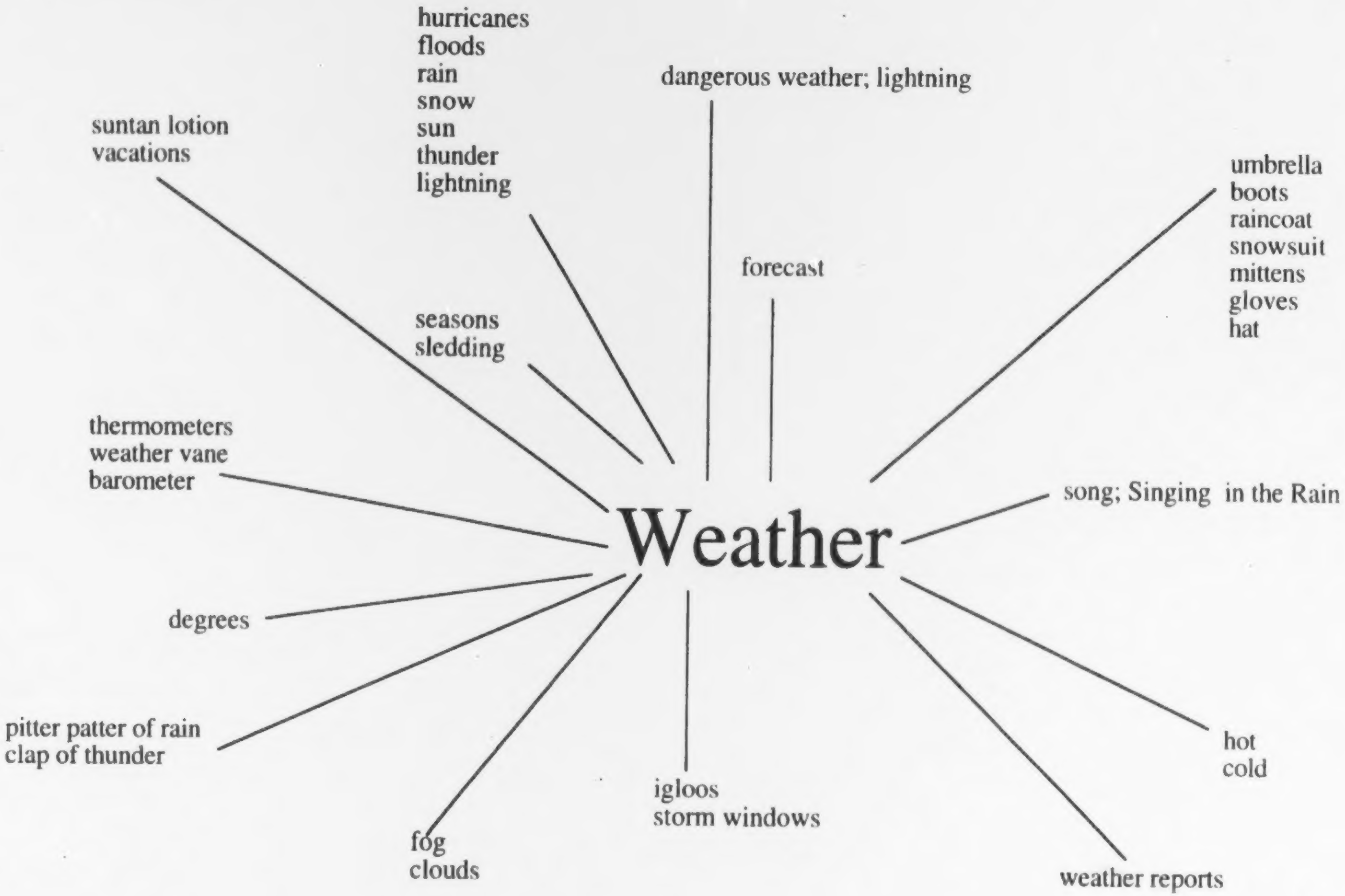
The following pages are sample stages in planning a unit on weather. Objectives, curriculum webs, and learning activities, as well as suggestions for evaluation are included. The sample lesson plans demonstrate integration of curriculum areas.

General Objectives for Weather Thematic Unit

- To encourage students to talk and think about weather.
- To learn about the elements of weather and climate.
- To gain an awareness of the impact weather has on peoples' lives.
- To experiment with weather related instruments.
- To record observations and measurements.
- To become more knowledgeable about precautions that need to be taken due to weather.

- To develop an understanding of the role of a meteorologist.
- To compare and contrast different weather conditions around the world.

Class Brainstorm



Weather

hurricanes
floods
rain
snow
sun
thunder
lightning

dangerous weather; lightning

suntan lotion
vacations

umbrella
boots
raincoat
snowsuit
mittens
gloves
hat

forecast

seasons
sledding

thermometers
weather vane
barometer

song; Singing in the Rain

degrees

pitter patter of rain
clap of thunder

hot
cold

igloos
storm windows

fog
clouds

weather reports

Weather

Drama

-Act out weather conditions
-Create a rain dance
-Perform a class play
-Broadcast the weather
-Model weather costumes
-Pretend to be a weather reporter

Literature

See books on weather

Writing

-Weather journals
-Weather poems
-Class books
-Vocabulary lists
-Weather riddles
-Weather broadcasts

Math

-Graph weather conditions
-Measure weather conditions
-Explore geometric shapes, i.e. snowflakes
-Estimate weather conditions
-Compare Celsius & Farenheit
-Solve word problems

Science

-Observe weather
-Predict weather
-Weather balloons
-Weather vanes
-Rain gauge
-Barometers
-Wind direction
-Weather instruments
-Cause & Effect of weather

-Record weather
-Condensation
-Evaporation
-Identify clouds
-Water Cycle
-Experiment heat from sun

Social Studies

-Study weather patterns
-Record weather from around the world
-Mapping skills
-Impact of weather: food, clothing, shelter
-Weather disasters: flood, tornado, hurricane

Visitors:
-Meterologist
-Someone in community who has experienced adverse weather conditions
-A parent who has been to another area of the world with contrasting weather

Special Events:
-Schoolwide weather broadcast
-Fashion show of weather clothing
-Build shelters that protect from weather and display

Music

-Sound Effects
-Choral Readings
-Songs
-Dances

Art

-Drawings
-Paintings
-Leaf rubbings
-Play scenery
-Illustrations

-Design weather shelters
-Murals
-Snow angels
-Shadow prints
-Wind sock

-Weather vanes

Theme: Weather
Integrating the Curriculum

Language Arts

- Discuss what we know and want to learn about weather
- Conduct daily weather reports
- Display weather books
- Compile and display weather vocabulary
- Create vocabulary word webs
- Create weather logs/journals
- Make weather books
- Create weather poems
- Read weather related books
- Tell weather riddles
- Write and broadcast weather reports
- Write a play about a weather disaster for class to perform

Art

- Illustrate weather poems
- Illustrate class books
- Make weather designs
- Make wind socks
- Create evaporation paintings
- Design weather shelters
- Make weather murals
- Design weather costumes
- Create rain paintings
- Design weather paintings
- Do leaf rubbings/snow angels
- Paint mural of field trip to weather station
- Design scenery for play
- Create shadow prints

Math

- Read and record daily temperature with thermometer
- Estimate daily temperatures
- Estimate rainfall/snowfall
- Graph daily temperatures
- Graph rainfall
- Compare degrees in Celsius/Fahrenheit
- Calculate average rainfall, snowfall, temperature
- Design symmetrical snowflakes
- Measure rainfall
- Calculate thunder/lightning timing.

Social Studies

- Identify weather symbols
- Display country/world weather maps
- Conduct weather scavenger hunts
- Study different weather patterns around the world
- Write pen pal letters requesting weather information and record responses on a map
- Discuss the impact of different weather on people
- Discuss weather safety
- Look at different types of shelters around the world in relation to weather
- Compare different clothing around the world in relation to weather
- Discuss the impact of weather on food supplies locally/worldwide
- Make murals of your community in the four different seasons
- Visit weather station

Music/Movement

- Create sound effects to mimic weather
- Recite choral readings related to weather
- Sing weather songs
- Act out weather conditions
- Create a rain dance

Science

- Examine and observe weather
- Observe, predict, check and record weather
- Look for cause and effect relationships related to weather
- Identify and use weather related instruments
- Make weather balloons
- Create a weather vane
- Make a rain gauge
- Make a barometer
- Test wind direction
- Create a model anemometer
- Use the Beaufort Wind Scale
- Conduct a cloud watch
- Identify different clouds
- Discuss the process of evaporation
- Study water cycle
- Observe the process of condensation
- Conduct a heat from the sun experiment

Sample Lesson Plan: Seasonal Weather Characteristics

Content Areas Involved

Science
Language Arts
Social Studies
Art

Objectives

- To compile a list of seasonal weather conditions.
- To understand how the weather affects our lives and the world around us.
- To discuss how the weather can influence the clothing that we wear and activities we participate in.
- To record in pictorial form relevant items for each season.

Materials

- Chart paper
- Crayons
- Markers
- Magazines
- Glue
- Long paper for murals
- World map/globe
- *A Weather Quiz* worksheet

Procedure

1. Brainstorm different weather conditions while recording student ideas on chart paper.

2. Distribute *A Weather Quiz* worksheet and allow time for children to complete.

3. Lead a discussion with students asking what they know about weather conditions in other countries.

4. Look at a world map and discuss seasonal differences in the northern and southern hemispheres.

5. Ask the students what would be appropriate clothing to wear in a country where it is very hot/very cold. Discuss physical activities people participate in during each season.

6. Arrange the class in cooperative learning groups of a maximum of four to seven children. Explain to each group that it will be assigned a season and provided with magazines. Ask the children to create a collage mural that represents their season using cut out pictures, markers, and crayons. Suggested items to be included are relevant clothing pictures, seasonal sporting activities, appropriate accessories.

7. Share each mural with the whole class and display around the room.

Assessment

In determining that learning occurred, teachers will perceive the extent to which the groups form generalizations for each of the four seasons when sharing their murals. The children should be able to verbalize characteristics of certain weather and the effect this has on people's lives.

A Weather Quiz

Read each description below and fill in each blank with an answer. Compare your answers with your classmates' answers.

1. Something you like to eat on a hot day. ____________________
2. Something you like to eat on a cold day. ____________________
3. An animal that likes to live in the cold. ____________________
4. Something that you wear when it is snowing. ________________
5. Something that could blow away. ______________________
6. Something that changes with the seasons. __________________
7. Something that protects you from the rain. ________________
8. Something you might do during a storm. __________________
9. Something that shouldn't get wet. ______________________
10. A plant that doesn't need much water. ____________________
11. Something you could do in the snow. ______________________
12. Something that comes out of a cloud. ______________________
13. Something you can only do in warm, sunny weather. _________
14. An animal that migrates due to seasonal change. ___________
15. A place to visit where it is hot. _________________________

Sample Lesson Plan: Making a Weather Vane

Content Areas Involved

Science
Math
Social Studies

Objectives

- To become familiar with different instruments that are used to measure the weather.
- To develop an understanding of how weather instruments aid meteorologists to predict the weather forecast.
- To make a weather vane and use this simple tool to measure wind direction.

Materials

- Stock card
- Scissors glue
- A straw
- A straight pin
- Pencil
- Eraser
- Colored pencils/crayons
- Thermometer
- Barometer

Background Information

A weather vane shows which way the wind is blowing. A weather vane often looks like an arrow on a pole. When the wind pushes the arrow, the arrow points in the direction that the wind is coming from.

Directions for making a Weather Vane

1. Use a ruler to draw a rectangle that measures 4 cm x 3 cm and a triangle with sides that measure 3 cm. Neatly illustrate your shapes with designs. Glue them on to construction paper. Then cut them out.
2. Cut two 2 cm slits at each end of the straw.
3. Push the rectangle into one end of the straw and the triangle into the other.
4. Pin the middle of the straw to the top of the pencil eraser. Make sure the straw can turn easily.
5. Take the weather vane outside on a day when the wind is blowing. Hold it out in front of you.

Procedure

1) Discuss with the children different tools that assist people to measure, predict, or evaluate the weather (thermometers, barometers, computers, satellites, radar). Show the children a thermometer and an aneroid barometer and explain their purposes. Discuss how the barometer helps meteorologists predict the weather.

2) Ask the students what tools might be used to measure the wind. Inquire if anyonehas seen a windmill and discuss its purpose. Can the wind be measured? How do you know (weather forecast-predictions and actual readings reported)?

3) Ask the children if they can tell which way the wind is blowing. What clues do they use? Explain to the children that they are going to be making a simple instrument to determine which way the wind is blowing.

4) Follow the directions provided to make the weather vane.

5) Take the children outdoors to test their instruments.

Assessment

In determining that learning took place, teachers will observe the children's ability to list different instruments used to measure weather. Through observation, the teacher should be able to assess how well each student was able to follow the directions and understand this simple weather instrument.

Additional Activities

Make other weather instruments. Once a variety of weather instruments have been made, invite parents, other classes, and teachers in for an informational sharing time. Use the class-made instruments to assist in composing a weather broadcast.

Sample Lesson Plan: Weather Shape Poems

Content Areas Involved

Language Arts
Art
Science

Objectives

- To be able to use descriptive language.
- To be familiar with weather vocabulary.
- To classify specific characteristics of weather.
- To produce crayon-resist artwork.

Materials

- Chart paper
- Markers
- Individual heavy white paper
- Crayons
- Water color paints
- Black permanent markers

Procedure

1. Review and record different types of weather in columns on chart paper.
2. Ask children to use descriptive language as they brainstorm different words to

to describe each type of weather listed on the chart. Write suggestions under each column. Invite children to first think of words that describe how each weather condition looks, then how it feels. Encourage the class to think of many different words that describe the conditions. Ask, "Can you think of another word to say the same thing?"

3. Use these words to form a "shape" poem:

   - Lightly outline the shape of a weather condition or portion of; e.g., raindrop, snowflake, on a new piece of paper.

   - Write their words on the outline so that the finished poem will be a collection of words in the shape of the chosen weather.

4. Demonstrate the steps involved in the crayon-resist technique:

   - Tell the children to create their own weather shape poems. Instruct the children to press down very hard as they use crayons to outline and color the shape that corresponds to their poem.

   - Paint over the crayon drawing with water colors. After the paint has dried, use permanent marker to write the poem around the artwork.

Assessment

In determining that learning occurred, the teacher can assess individual student's poems and the effectiveness of using descriptive language.

Weather Scavenger Hunt

Use any weather resources such as the weather section of a newspaper, an atlas, Almanac to find the items for this scavenger hunt. Ask students to find out:

1. Today's date
2. The predicted high temperature for today
3. The predicted low temperature for today
4. Tomorrow's forecast
5. Two symbols used on a weather map; draw and record what each means
6. A place where the average temperature is similar to where you live
7. Two cities in your country and their high and low temperatures
8. A place where it is predicted to rain today
9. A city whose high and low temperatures differ by more than 20 degrees Fahrenheit
10. The time of today's sunrise and sunset
11. The city with the highest temperature you can find
12. The city with the lowest temperature you can find

Thematic Unit of Study: Wool

The Wool Process

The following section presents an in-depth study which follows the process of creating a wool weaving from the first step of shearing the sheep to the final product. The project was done with a class of eight-year-olds as a social studies unit to teach the concepts of: historical perspective about how fabric was made long ago; the importance of sequencing activities, and planning. The teacher also wanted to present a theme which would engage the children's curiosity and imagination through which important content could be taught. For example, science skills are learned when the children observe a sheep being sheared, wash the fleece, and experiment dyeing the wool with natural materials. They pick, card, and spin the fleece into a tapestry for art. Each student records the steps of the wool process, illustrates the work, and adds feelings and thoughts about the process to create individual books. The awareness of creating something from raw materials provides satisfaction and appreciation for the work and time it took to make clothing before modern technology. It allows the children a real life experience to feel connected to the past.

Steps in the Wool Process

1. Shear the sheep
2. Wash the fleece
3. Dye the fleece
4. Pick and card the fleece
5. Spin the fleece
6. Weave

- Begin the wool unit by asking the children to bring a favorite sweater, blanket, scarf, or pair of mittens to school.

- Have children find out what it is made of by reading the label.

- Make a list of the materials on chart paper.

- See if the students are able to tell the difference between natural and synthetic fabrics.

- Talk about wool.

  Where does it come from?
  How does it get from the sheep to the clothing?
  What processes take place?
  How do they get so many different colors?
  Who does this?

- Ask your students what they know about sheep, wool, and the wool process.

- Record their answers on chart paper.

- Make another list of things your class would like to learn about wool and the wool process.

- Post the chart in the classroom to review as they proceed through the steps of the process.

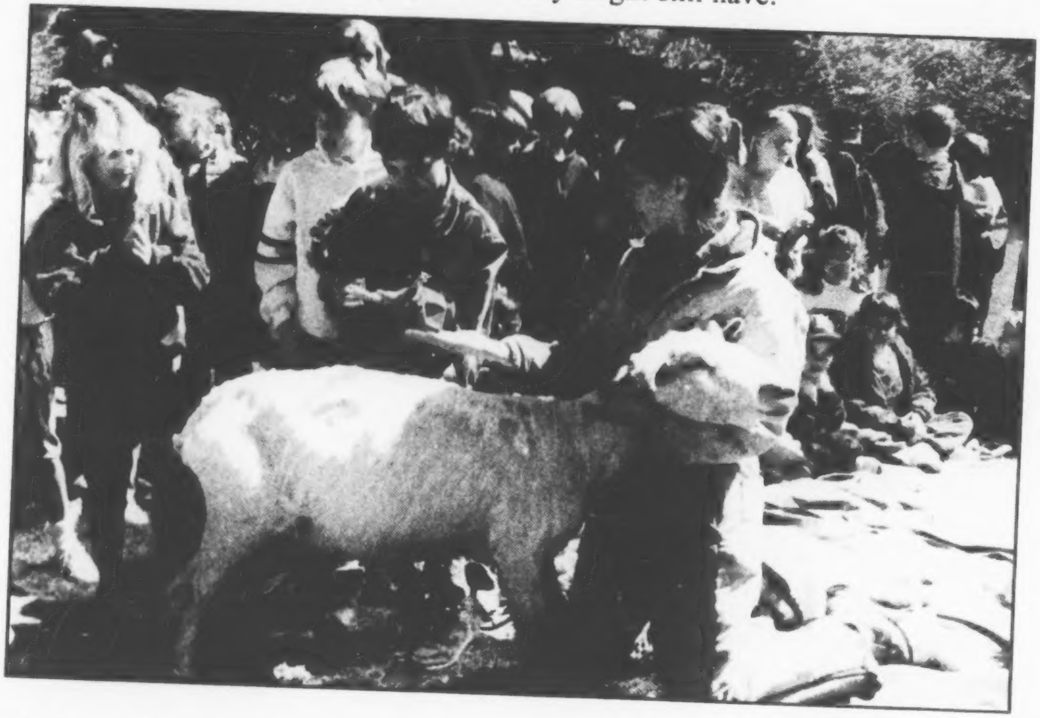
Shearing the Sheep

To begin, invite a shepherd to your school or visit a local farm and let the children see a sheep being sheared. (If this is not possible, you may be able to find a film about sheep shearing that the children can watch or read a book, see bibliography.) Springtime is a good time of year to do this and hopefully there will be some baby lambs with their mother. The children will enjoy feeding the baby lambs and watching how they interact with the ewe. The shepherd will describe how sheep are sheared and will provide the children with the opportunity to feel the rich lanolin in the fleece.

Before the sheep shearing,

- Have the children create a list of questions that they want to ask the shep herd about sheep and shearing a sheep.

- Record these questions on chart paper. Allow time after the sheep shearing for the students to ask any question they might still have.



Washing the Fleece

The next step in the wool process is washing the fleece. This can be done in the classroom or outside in tubs filled with warm water and a gentle cleaning detergent.

- Give each child a handful of fleece to be responsible for.
- Divide the children into small groups and have them gently swirl their fleece through the soapy water to clean out the dirt.
- Encourage them not to squeeze the fleece because it will mat up. The fleece should then be rinsed in clean water, gently squeezing out the water and spread out on the ground to dry.

Dyeing

Dyeing the fleece is the next step in the process and it can be done in the classroom with the help of parents. See the references for ideas of types of dyes you can use; pick and choose some that are convenient for you. Onion skins dye is an easy recipe to do and is usually readily available. Experimentation with dyeing is encouraged.

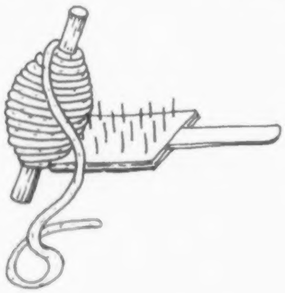
- Vary the length of time of dyeing.
- Change the pH of the dye bath producing variations in color.
- Have students write out recipes for their dyeing methods.

The children will enjoy experimenting with the different colored dyes and seeing the beautiful colors that they make.

If you have 30x magnifiers available, the students will enjoy examining their wool and doing fabric tests to determine the fabrics properties.

Picking and Carding

Next the children pick and card their fleece in the classroom. The children pick the fleece by hand to remove any dirt particles that did not get removed from washing the fleece. Next they card the wool to align the fibers and fluff them up for spinning. Carding is like combing your hair and is done with metal carding combs.



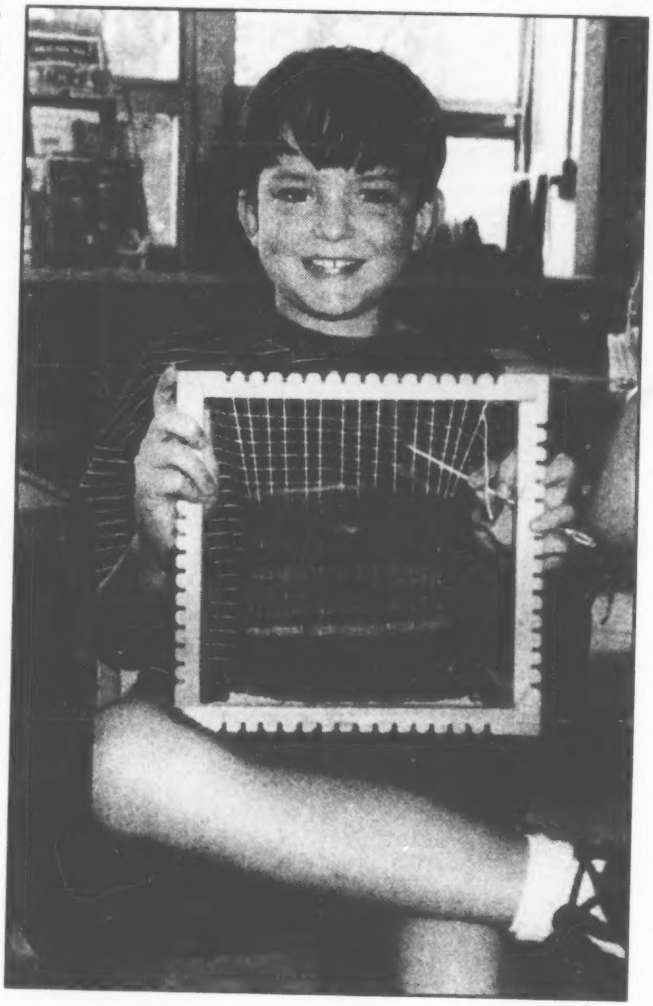
Spinning

Spinning is a very exciting part of the wool process. If possible try to get a spinner to come to your school to demonstrate spinning and help the children spin their fleece on the wheel. This process can also be done with drop spindles. It is a special time for the children when they see their fleece turned into spun yarn.

Weaving

Now the children are ready for the final step in the wool process, weaving their spun fleece into an original design. Inexpensive looms can be made out of cardboard if wood ones are not available. The children enjoy designing their weaving patterns and realize how much yarn it takes to make even a small weaving.

We involve literacy in this thematic unit by having the children record each step of the wool process in a book. After they experience each step, they are given time to record their observations and feelings. Encourage the children to uses all their senses when writing about the process, the smells of the sheep, the feel of lanolin, and any new vocabulary words that they have learned. This becomes a written document for them to enjoy for years to come and an evaluation tool for the teacher showing how well they understood the concepts covered.



Sample Activities

The following ideas are some activities to do with your class while studying the wool process. They can also be activities for children to do with their families at home.

- Choose a book from the class library to read about sheep.
- Make a list of the 10 most interesting facts that you learned about sheep.
- Share these with classmates.
- Make a group list on chart paper of all the facts the class has learned about sheep.

Lanolin Scavenger Hunt

- Discuss these questions with your class. What is lanolin? How does it help a sheep (cuts heal quickly, protects the sheep from the rain)? How does lanolin help us?
- Ask the students to go on a scavenger hunt at home (or a local grocery store) to find products that have lanolin in them. They will need to read the labels.
- Have the students make a list of these products. If possible have them bring some of the products in for a class display.

Integrating the Curriculum: Creating a Wool Weaving

Language Arts

- Discuss what we know and what we want to learn about sheep and the wool process.
- Read books about sheep and the wool process.
- Learn vocabulary unique to the wool process.
- Make books describing the steps of the wool process and experiences of working through the process.
- Write poetry about sheep and the steps in the wool process.
- Write and perform a class play for the school and parents demonstrating the wool process.
- Map steps of the wool process.

Art

- Illustrate a wool book.
- Design pattern for weaving.
- Weave spun wool on a loom.
- Learn color names of dyes used.

Math

- Estimate then measure the length of spun yarn made from one rollag.
- Multiply that by the number of rollag to find out how much wool you have.
- Estimate how many sweaters can be made from one sheep.
- Graph favorite dyes on a class graph.

Social Studies

- Watch shearing demonstration.
- Clean, dye, card, spin and weave wool.
- Locate areas on a map where sheep are raised in your country.

Science

- Study fabrics under a microscope.
- Observe differences between natural and man-made fabrics.
- Clean lanolin from fleece.
- Learn about natural dyes used for dyeing fleece.
- Experiment with different types of dyes and different lengths of dying time.

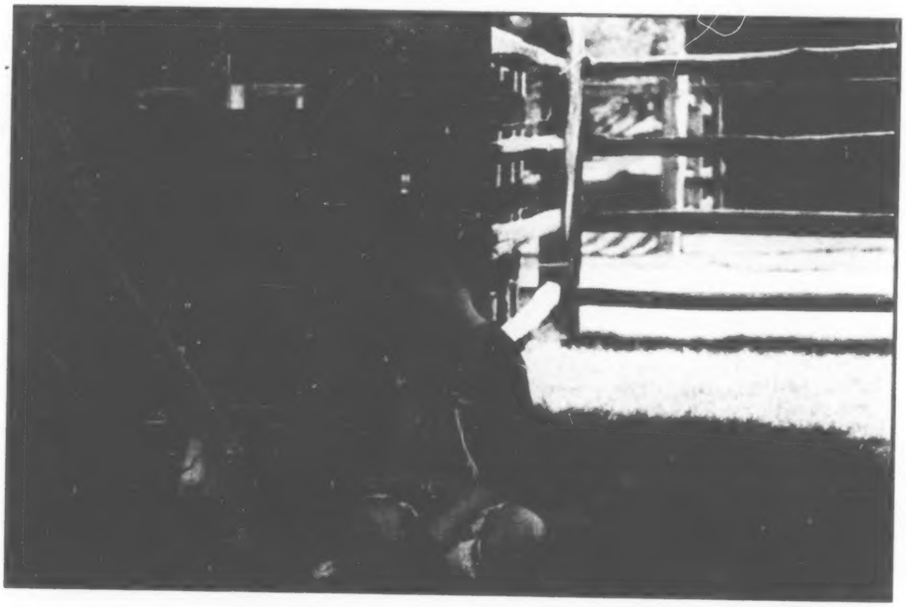
- Learn parts of the spinning wheel and how it works.

Music/Movement

- Sing spinning songs.
- Use small motor movement and eye hand coordination needed for carding, spinning and weaving.

Visitors and Special Events

- Invite a shepherd to do a sheep shearing at your school.
- Invite a spinner to come in and spin with your class.
- Ask if parents from the school spin at home for a hobby and would be willing to come in and spin with your class.



Thematic Unit of Study: Bats

As most children love to study and learn about animals, a thematic unit using an animal as its focus is usually quite successful. An animal theme is a wonderful way for children to compare their own lives with other living beings.

Bats are an unusual and interesting animal to learn about. The fact that bats are mammals that fly, immediately draws children's interest to further study. This interesting fact lends itself to a discussion of the characteristics of mammals and why bats are considered mammals. Of course, a study of bats will involve many science discussions. Through listening, reading, and discussing, the children will explore areas of habitat, feeding, reproduction, echolocation, survival-enemies, and physical characteristics.

A unit about bats involves social studies as the children compare their habits with the habits of the bats. Children will also learn how bats communicate. The children will use mapping skills as they define the locations of bats in the world.

Mathematics can be taught in the study of bats. Children can measure and compare the wingspans of different bats using string. The children can compare the weights of different bats and make models of bats to scale.

A bat unit provides many opportunities for reading and writing, such as reading and making information books, writing bat stories, bat poetry, and creating bat drama that can be made into a play or a videotape. A bat unit will easily incorporate art activities from making models, to making bat environments, to other ideas generated from the children.

The physical environment of the classroom should reflect the bat theme with the children's art work displayed, bulletin boards exhibiting photos, bat vocabulary and information about bats, book racks containing fiction and non-fiction books about bats, as well as book racks containing stories written by the children about bats.

Thematic teaching allows for both individual and group projects. Often projects are a result of the children's interest in a particular aspect of the theme chosen. For example, the children of one class studying bats became fascinated with the importance of bat conservation. When two children were playing a game teaching others about bat myths and the need to conserve the bat population, the teacher decided to create a bat video with the class to inform the rest of the school about bats. This was a terrific culminating project. A culminating project is a way of assessing children's knowledge about the theme and an integral part of a thematic study.

Theme: Bats

Content areas follow in which the theme of bats can be explored and lesson plans can be created follow.

LANGUAGE AND LITERACY:

Read fiction books about bats
Read non-fiction books about bats
Write stories about bats
Write poetry about bats
Build a bat vocabulary
Create plays, videotapes about bats

SOCIAL STUDIES:

Discuss how bats communicate and how they compare with humans
Discuss how bats live (colonies) and how they compare with humans
Map locations of bats
How we can help conserve the bat population

SCIENCE:

Explore these topics:

  Physical characteristics
  Habitat (including caves and how caves are formed)
  Roosts
  Echolocation
  Reproduction
  Survival-enemies
  Conservation

MATHEMATICS:

Measure wingspan of bats using standard and nonstandard measuring tools
Make models to scale
Compare weights of different bats
Discuss how many live in colonies
Build a bat house

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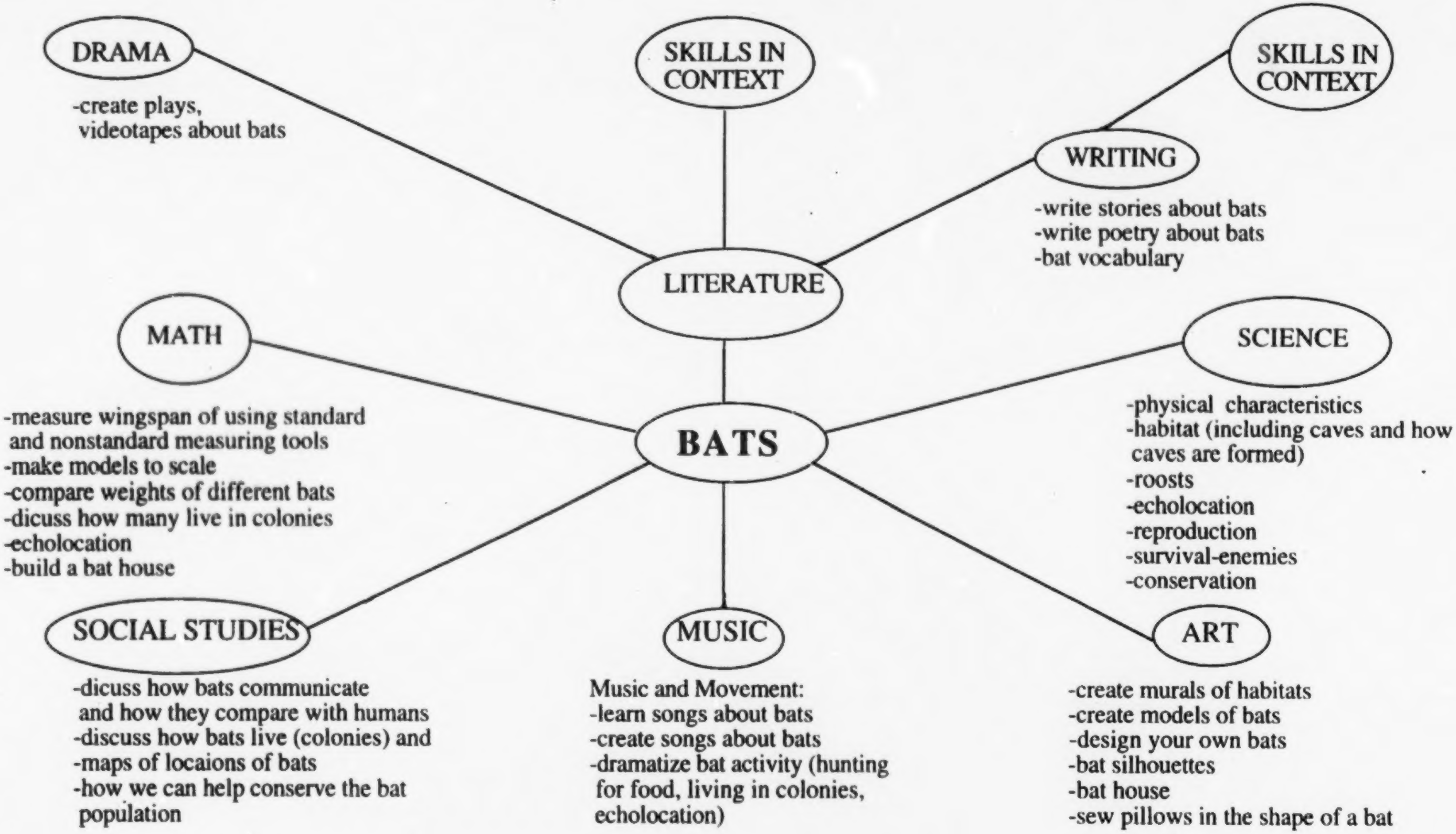


DRAMA
-create plays,
videotapes about bats

SKILLS IN CONTEXT

SKILLS IN CONTEXT

WRITING
-write stories about bats
-write poetry about bats
-bat vocabulary

LITERATURE

MATH
-measure wingspan of using standard and nonstandard measuring tools
-make models to scale
-compare weights of different bats
-dicuss how many live in colonies
-echolocation
-build a bat house

BATS

SCIENCE
-physical characteristics
-habitat (including caves and how caves are formed)
-roosts
-echolocation
-reproduction
-survival-enemies
-conservation

SOCIAL STUDIES
-dicuss how bats communicate and how they compare with humans
-discuss how bats live (colonies) and
-maps of locaions of bats
-how we can help conserve the bat population

MUSIC
Music and Movement:
-learn songs about bats
-create songs about bats
-dramatize bat activity (hunting for food, living in colonies, echolocation)

ART
-create murals of habitats
-create models of bats
-design your own bats
-bat silhouettes
-bat house
-sew pillows in the shape of a bat

SPACE

Social Studies

- Study the lives of astronauts
- Record moon phases for other countries
- Space exploration worldwide
- Impact of satellites on our lives
- Create an "ideal" planet—human existence, plant life, ecosystems, pollution control
- Space transportation

Drama

- Space walking
- Star Trek scene
- Mission control re-enactment
- Space shuttle re-enactment

Science

- Star study
- Telescope observation
- Create stargazers
- Compare/contrast planets
- Brew sun tea
- Predict sun/moon phases
- Identify constellations
- Create constellation game
- Study satellites
- Night/Day
- Gravity experiments
- Track orbit paths
- Study weightlessness

Math

- Sorting "moon rocks"
- Measuring distances, light speed
- Travel times/speed
- Large number study
- Rocket launch time telling
- Liftoff ladders—number sequencing
- Star number facts

Literature

- Please Bring Me The Moon
  Eric Carle
- Where In the World is Walter?
  Don Ross, Sue Levytsky
- Poetry

Art

- Paper maché planets
- Sponge prints
- Solar system mural

Writing

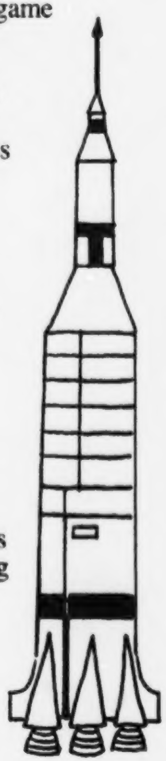
- Write constellation myths
- Sun Poetry
- Mission Control scripts
- Space Journals
- Vocabulary word books
- Space stories
- Space riddles
- Star Trek script

Music

- Sound Effects
- Space dancing

Special Activities:

- Planetarium visit
- Astronomer visitor
- Astronaut letters



Dinosaurs

Math

-Height measurments; comparing dinosaurs to people, dinosaurs to dinosaurs
-Time line exploration and creation
-Graphing
-Dinosaur logic

Literature

-Read aloud: The Enormous Egg by Butterworth
-Patrick's Dinosaur

Special Activities

-Visit museums
-Paleontologist visitor
-Cooking fossils

Social Studies

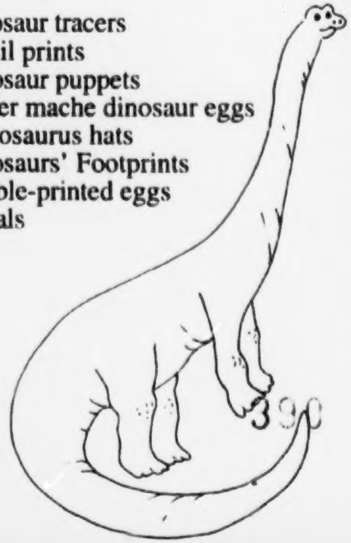
-Label and map areas in the world where dinosaurs are discovered
-Dinosaur question of the day; family research
-Geography, land masses re: dinosaur habitats

Drama

-Jurrasic Park—movie
-Puppet show (create puppets)
-Perform "Five Enormous Dinosaurs"

Art

-Dinosaur tracers
-Fossil prints
-Dinosaur puppets
-Papier mache dinosaur eggs
-Stegosaurus hats
-Dinosaurs' Footprints
-Bubble-printed eggs
-Murals



Music

-Sing dinosaur songs; write class versions
-Sound effects

Writing

-Vocabulary word banks
-_______osaurus book
-Dinosaur Dictionary
-Dinosaur myths re: extinction
-Dreamed up dinosaurs

Science

-Stratigraphy (earth's layers)
-Fossil study
-Make fossils using clay
-Compare/contrast plant eaters and meat eaters
-Explore skeletons, bones

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Early Childhood Faculty Seminar: School and Family Partnerships – a university-level course designed for use by early childhood education faculty

Early Childhood Faculty Seminar: Learning Through Play – a university-level course desinged for use by early childhood education faculty

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